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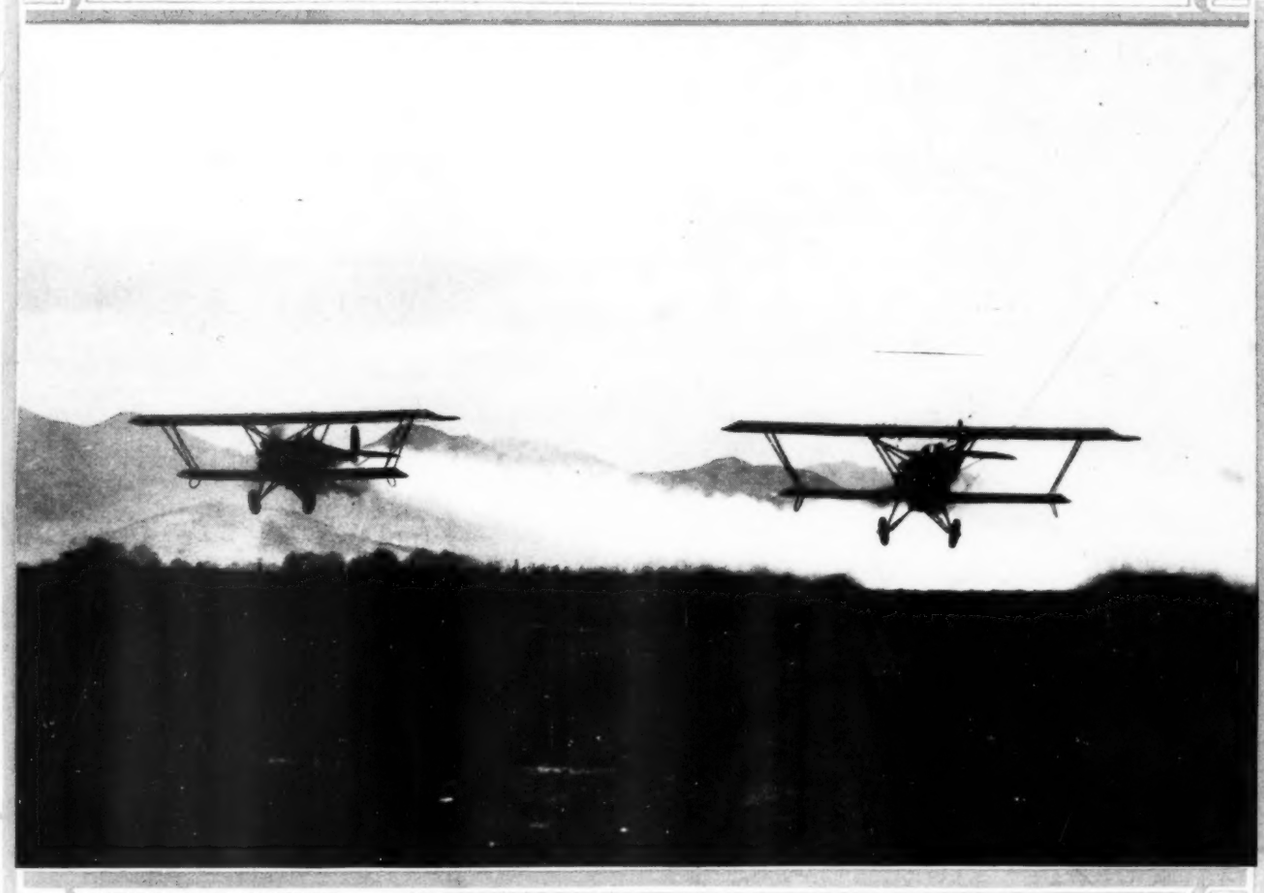

Action picture of two Huff Daland Dusters in operation at Lima, Peru

VOLUME XXV

NUMBER 14

The Export Number

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250 WEST 57TH STREET, NEW YORK

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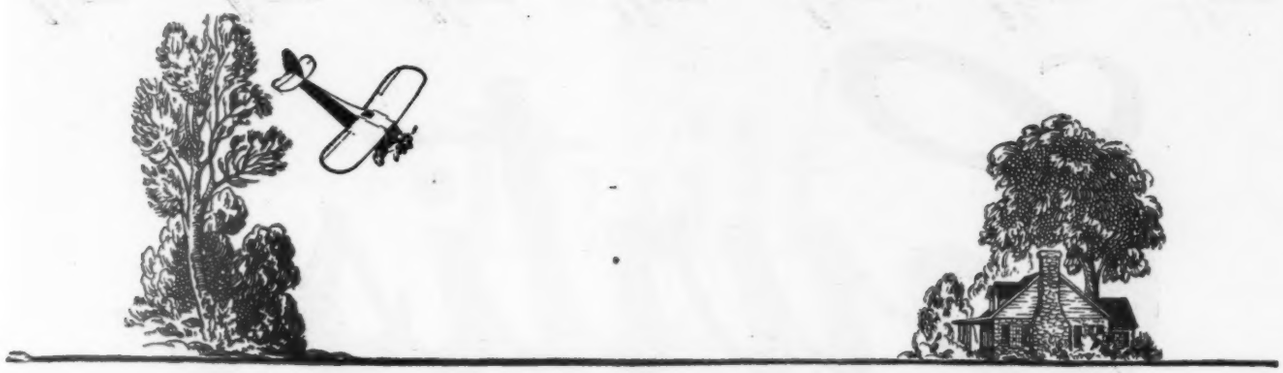

IF YOU....

had to side-slip into a small field like this . . . . . how would you get out?

DEALERS

American Aircraft Corporation, *Los Angeles, Calif.*

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IF, for any reason, you landed the conventional type of airplane in a small field with insufficient space to take-off, you would very probably have to dismantle the 'plane to get out. If, on the other hand, you landed in the same diminutive field with a Fairchild Cabin Monoplane, you need only fold back the wings and taxi out, or be towed to a more desirable field.

During the Aircraft Show at Detroit, a Fairchild Monoplane with folded wings, was towed by a five passenger automobile from Times Square, the heart of New York City, through congested traffic, to Curtiss Field, Long Island—twenty-one miles—where the wings were spread and the 'plane flown directly to Detroit. The wings were again folded on landing at Detroit and the 'plane was towed by a roadster to Exhibition Hall.

When it is necessary to anchor your 'plane to protect it from the ravages of a sudden wind storm, there is little chance of damage to a Fairchild Monoplane with the wings folded and the 'plane properly secured.

If the foregoing reasons alone would not warrant folding-wing construction, the conservation of hangar space made possible by folded wings would suffice. For, in the same identical space required to store four non-folding wing 'planes, eight Fairchild Cabin Monoplanes with folded wings can be housed more conveniently and more accessibly.

Just two minutes by actual test are required for two men to fold or unfold the wings of a Fairchild Monoplane. Any Fairchild dealer will gladly demonstrate this unique feature and show you the innumerable other advantages characteristic only of Fairchild Cabin Monoplanes — the product of the largest and most complete engineering organization devoted to commercial aviation. Fairchild Airplane Manufacturing Corporation, 270 West 38th Street, New York City.

A Fairchild Cabin Monoplane can be stored with wings folded in a space 14 feet x 31 feet.

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Curtiss Robin

SPECIFICATIONS

Name	Curtiss-Robin
Type of Plane	Semi-Cantilever Monoplane
Design	Three Place Enclosed Cabin
Color	Burnt Orange and Yellow with Black Trimmings.
Wing Spread	41 feet
Length	25 feet 9 inches
Height (*over all*)	7 feet 9½ inches
Motor	Curtis OX-5-90 horsepower

Planes are designed to accommodate air-cooled motors when they reach a popular price level.

Gasoline Capacity		50 gals. (25 gals. in each wing)
Weight	(*Empty with water*)	1489 lbs.
	Useful load	728 lbs.
	Gross Weight	2100 lbs.
Price at Factory		$4,000.00

PERFORMANCE WITH FULL LOAD

High Speed (*miles per hour*)	100
Landing Speed (*miles per hour*)	40
Cruising Speed (*at 1300 r. p. m.*) M. P. H.	85
Rate of Climb (*ft.-min*)	450
Endurance, Full Throttle (*hours*)	5.56
Endurance at 1300 r. p. m. (*hours*)	7.1
Miles per gallon of gas	12
Range, Full Throttle (*miles*)	556
Range at 1300 r. p. m. (*miles*)	604
Service Ceiling (*feet*)	12,000
Absolute Ceiling (*feet*)	15,000
Climb in 10 Minutes (*feet*)	4,100

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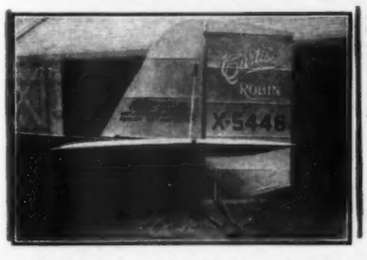
Built *for* Safety

"It's next to impossible to make it spin unless you use brute force . . . It certainly is a smooth-riding ship . . . I've never piloted a plane that requires so little effort to keep it on a straight, true course." These are the enthusiastic judgments of pilots and aviation authorities after flying the Curtiss-Robin.

They all agree on the remarkable safety, stability and dependability of this plane. This is no mere coincidence. These three vital factors were built into the "Robin" by the same staff of engineers that made Curtiss military aircraft famous throughout the world.



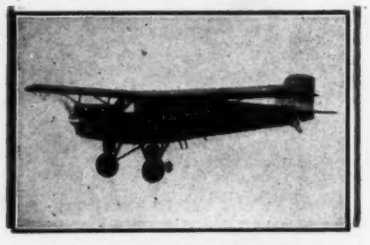
The large fin and rudder area insure smooth, straight flying. Note the rugged construction of the detachable tail skid.

Many months and thousands of dollars were invested in testing and re-testing every feature of design and construction before final specifications were approved. No detail, however small, was overlooked. Everything was done to make it the finest and safest commercial airplane in the country.

The materials and equipment of the "Robin" were accepted as standard only after they were proved the best money could buy for the purpose. They had to meet the rigid Curtiss requirements. All parts test to more than Department of Commerce specifications.

This same accuracy and care is evident in every step of manufacture. Every operation is thoroughly checked, inspected and re-inspected . . . especially in the hidden, vital sections of this plane . . . to more than meet all demands for strength and safety.

Curtiss-Robertson thoroughness is apparent also in the selection of its dealer organization . . . the requirements of which are competence, responsibility and ability to provide complete satisfaction to Curtiss-Robin owners.



The Curtiss-Robin photographed during one of the numerous and accurately-checked test flights. Every "Robin" is test flown.

There are additional facts about the Curtiss-Robin that will interest you. May we send them? Write.

CURTISS - ROBERTSON AIRPLANE MFG. CO.,
Anglum, St. Louis County, Missouri.

Colonel Lindbergh looped the "Robin" seven consecutive times during a test flight. The following day, with Major Robertson as passenger, Colonel Lindbergh flew the Curtiss-Robin from New York to Saint Louis.

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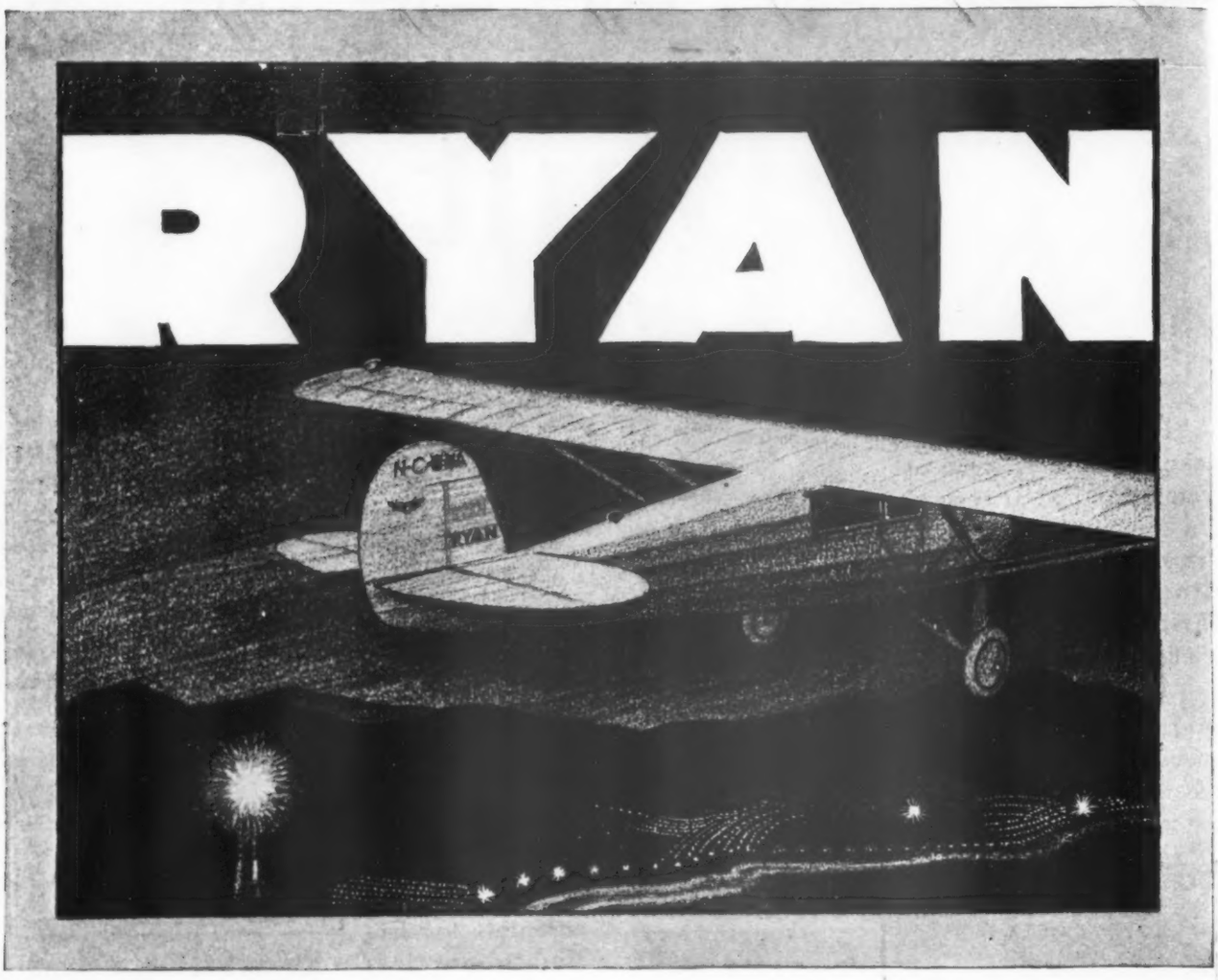

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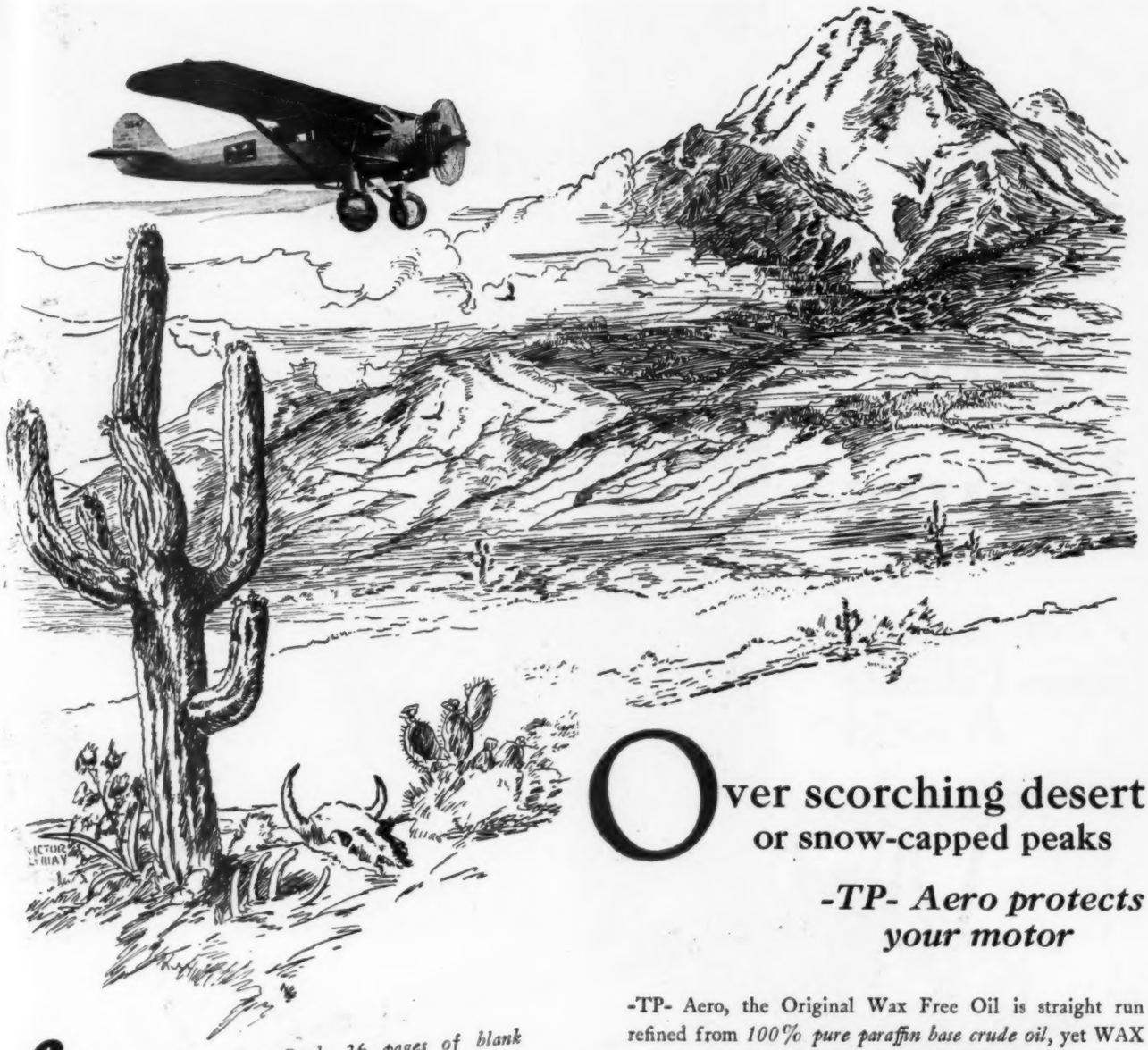

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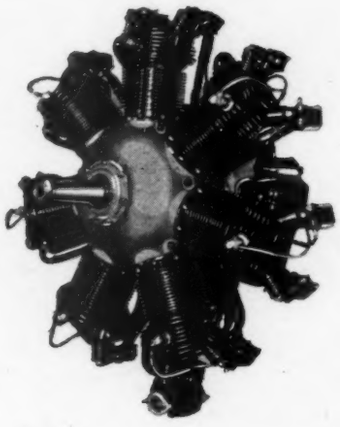

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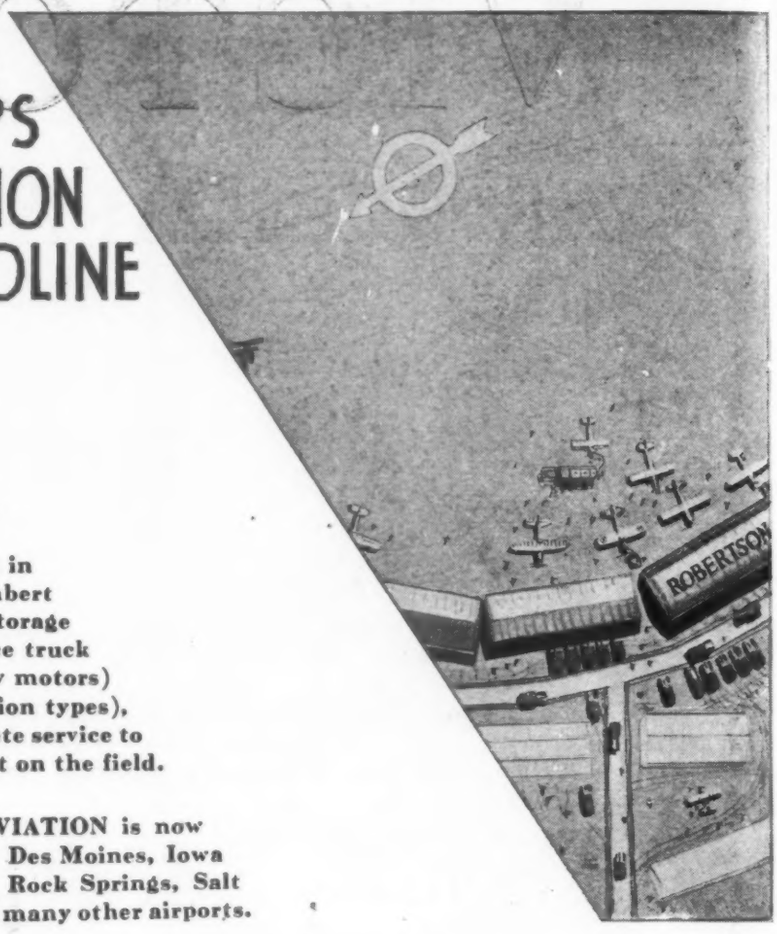

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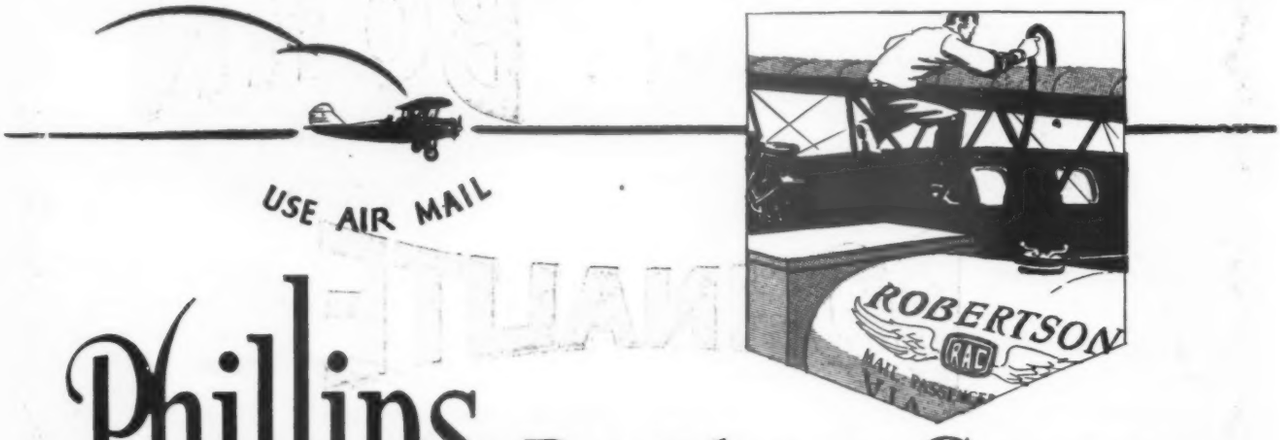

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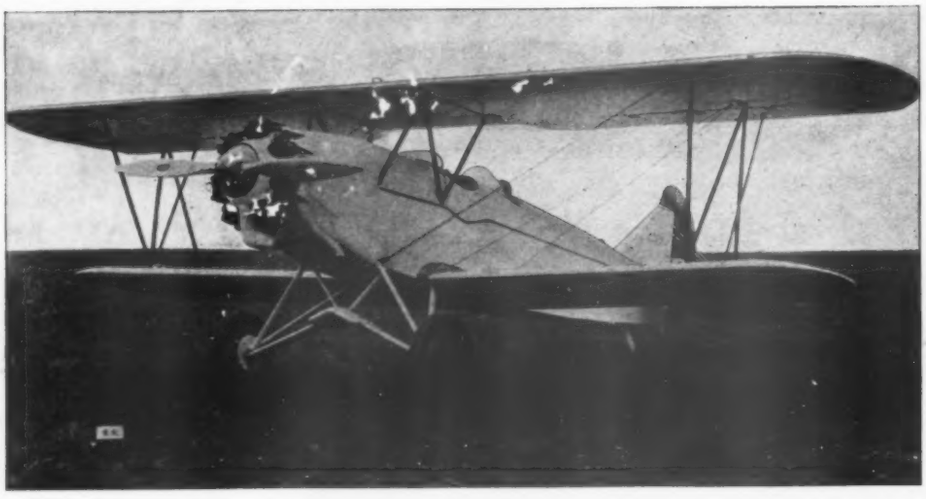

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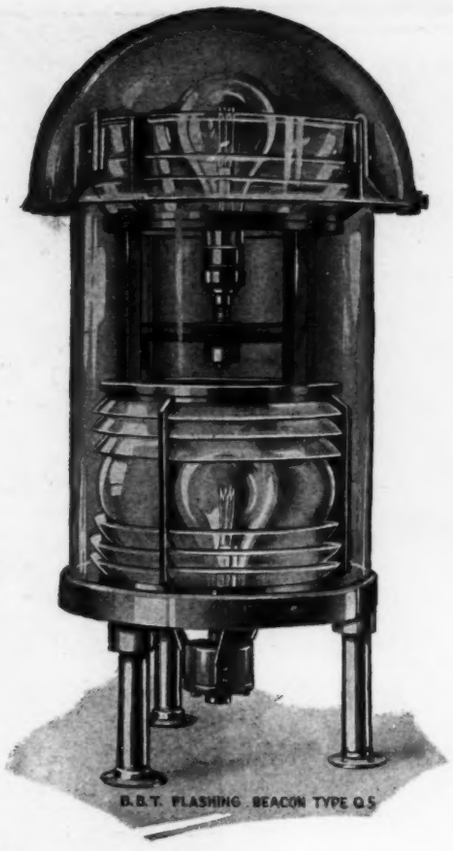

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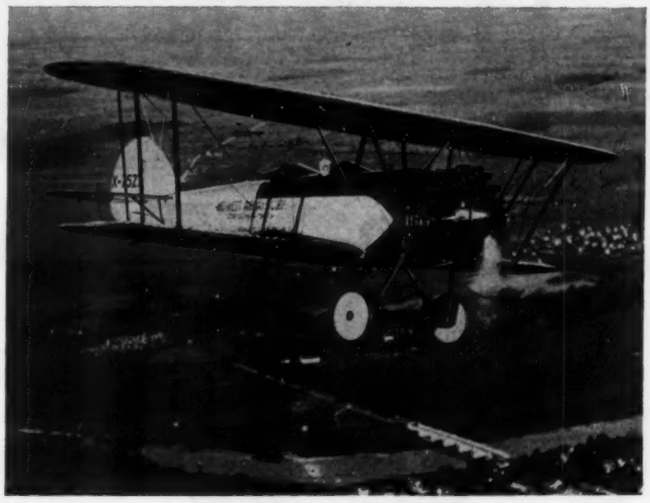
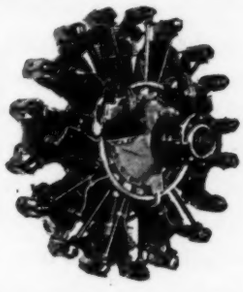


J. H. Livingston's Waco, Class B Derby Winner, powered with a 200 h.p. Wright J5 "Whirlwind"



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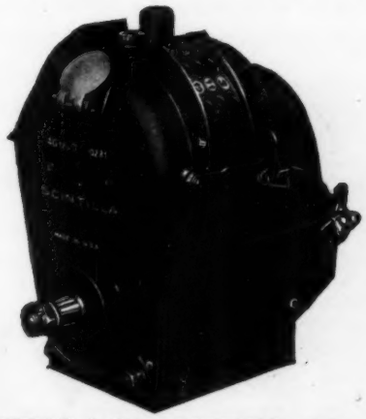
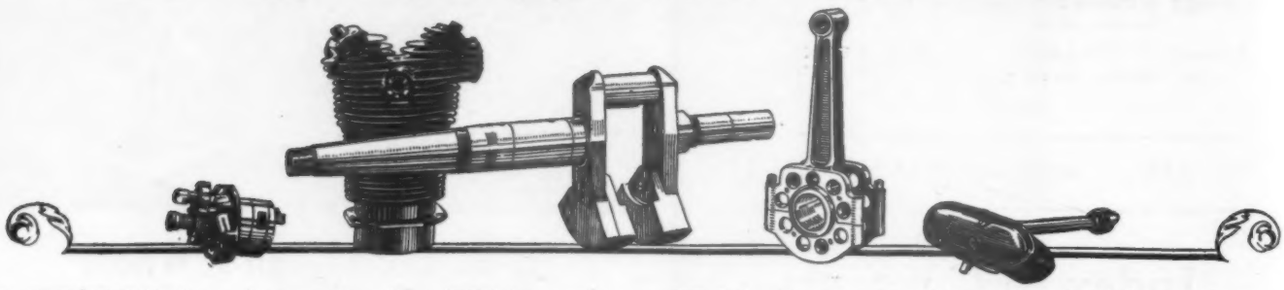
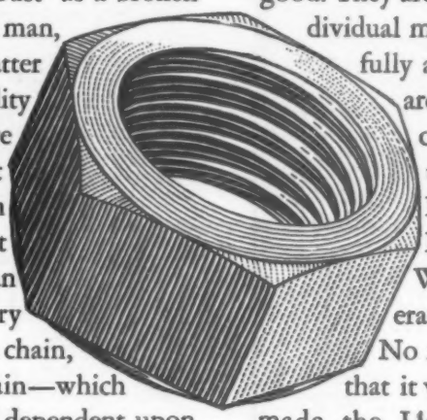


SCINTILLA MAGNETO CO., INC.
SIDNEY, NEW YORK
Contractors to the U. S. Army and Navy

There is *NO* Most important part of a WRIGHT ENGINE

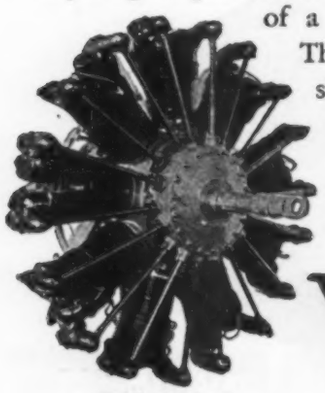


"THIS little rocker arm", said a Wright workman, "could cause as big a 'bust' as a broken master rod". The attitude of this man, his realization that his job, no matter how small, involves a responsibility as important as that for the entire engine, is typically Wright. That is what is meant by the expression "Wright engines have no most important part". Every workman throughout the Wright factory knows he is forging one link in a chain, and that the strength of that chain—which perhaps must span an ocean—is dependent upon the link he makes.



Every part—however small—is made with the same care as every other part. The steel for a tiny nut or bolt is heat-treated, machined, inspected, tested and retested with the same scrutiny, the same vigilant alertness, the same refusal to pass anything but perfection, as characterizes the making of a master connecting rod. This knowledge of responsibility, permeating every individual workman in the Wright factory, is what makes Wright engines good. They are designed right, made by special individual method in every tiny part; built carefully and slowly by men who know they are making an unusual product...one on whose performance the eyes of the world may rest at any moment. Never has this spirit faded. The day Lindbergh landed in Paris behind his Whirlwind Engine, the Wright operating force paraded through town. No man was their leader: each man felt that it was the perfection of his work that made the Lindbergh achievement possible. Lindbergh's engine was *their* engine.

There is "no most important part" in a Wright engine. Each part carries the full responsibility of performance, because failure in any part is failure in the whole...For more than a decade Wright has been building engines with just such care as this...to produce aircraft power plants that measure up to the highest standard of excellence ...an unchanging policy which explains Wright engine performance.



Wright "Cyclone" Aeronautical Engine

That's why More Pilots fly them!

WRIGHT

WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J., U. S. A.

CANADIAN WRIGHT LIMITED, Sole Licensees for Canada, Montreal

Wright "Whirlwind" Aeronautical Engine

AUTHORIZED PARTS DEALERS

Air Associates Inc.—*Curtiss Field, Long Island, N. Y.* Pacific Aeromotive Corp.—*Los Angeles, Cal.* Stout Air Services, Inc.—*Dearborn, Mich.*

AVIATION

The Oldest American Aeronautical Magazine

Vol. XXV ***SEPTEMBER 29, 1928*** **No. 14**

Foreign Advertising

ACCORDING to statistics made available by the Aeronautics and Communications Section, Transportation Division, Bureau of Foreign and Domestic Commerce, a total of 87 airplanes were exported during the first six months of this year, as against 63 airplanes exported during the whole of 1927. A comparison of the figures gives one a fair idea of the rapid progress that is being made in the export side of the industry. To maintain, and what is more, to increase, that foreign sales level is the desire of every one concerned.

The number of sales mades thus far have been attributed to the recent splendid performances of American-made planes in transoceanic and transcontinental flights, and the various selling missions that have been dispatched to foreign countries by American manufacturers. However, it stands to reason that future flights will not make the lasting impressions that were made by Lindbergh, Chamberlain, Goebel, Brock and Schlee and a host of others. And it also stands to reason that it would be far too expensive for American aircraft manufacturers to maintain active selling missions in all of the foreign markets.

That being the case it would seem as though the American manufacturer would do best to secure sales in the foreign market similar to one way he secures sales in the domestic market . . . by advertising. Whether the purchase of space in foreign aeronautical publications is worth the expense remains to be seen. However, the printing of discriptive booklets and folders in three or four languages, such as, English, French, Spanish and German, would incur very little expense and should prove most valuable if properly distributed.

The distribution of the booklets and folders could be handled in various ways. If per chance the manufacturer establishes an agency or appoints a representative in each of the foreign markets then the advertising literature could be effectively distributed by either of those two parties. Another way is to obtain a foreign prospect mailing list and distribute the advertising material direct to the prospects. A third way and one which should be most effective, would be to solicit the assistance of the United States Bureau of Foreign and Domestic Commerce in supplying its trade commissioners with the booklets and folders for distribution to all prospective customers. The Bureau has been of invaluable assistance in the past, and perhaps arrangements might be made for the rendering of this additional assistance.

In the event that the manufacturers did not care to advertise individually they might obtain good results by cooperative advertising. The aircraft manufacturers' section of the Aeronautical Chamber of Commerce could prepare a booklet describing all of their products. Or some sort of arrangement might be made by the exhibitors participating in an aircraft show to pay for the printing of a booklet giving descriptions and prices of the products displayed. The Aero Chamber did that very thing in connection with the affair at Bolling Field in 1927, and according to reports it was well received by foreign markets.

Shipping Plants

AT the present stage of the development of the aeronautical industry the geographical location of the manufacturer would seem to play a prominent part in the matter of exporting equipment. The manufacturer who is located in the central part of the country is forced to pack his equipment at the factory and then ship it overland by rail to the port of embarkation where it is transferred to the steamship. On the other hand, the manufacturer who is situated at a seaport has but to pack his equipment and send it by truck straight to the steamship pier, and the actual cost of transporting that equipment from the factory to the ultimate consumer is proportionately less than the cost to the manufacturer who is located inland.

In the matter of exporting automobiles the automobile manufacturers have established shipping plants at the various seaports. To these plants are sent the parts of the car, direct from the factory, for assembly and packing for shipment overseas, or for packing and shipment completely knocked down, "C. K. D."

Although the amount of exporting being done at present by the aeronautic industry does not warrant the expense of establishing assembly and packing establishments at seaports, it would not be unwise for the aircraft manufacturer to give this matter serious consideration as a means of preparing for the time when foreign sales will become an important factor in his business. The transporting of aircraft by rail is a problem in itself due to the size of the product. An assembled automobile, ready to run, is more or less compact and relatively easy to crate and ship, whereas it is an impossibility to ship by rail a completely assembled airplane. Therefore the matter of shipping a plane completely assembled is out of the question.

It has been stated that due to the great size of a crated plane in proportion to its weight, it has been found a most expensive proposition to transport airplanes by rail. For this reason most manufacturers have been making domestic deliveries by the air route. In other words the plane was flown to the customer. In many cases the customer has taken delivery of his plane at the factory and flown it away himself. Whether rail freight rates will be eventually reduced to a point where they compare with the cost of delivery by air is felt to be highly improbable.

Consequently, if delivery to the domestic customer by the air route is the cheapest, then it would seem the best for manufacturers who are sending planes abroad, and are located inland, to fly their planes to the port of embarkation. There they can be knocked down and packed properly for the ocean trip. In this way the factory is spared the task of packing, and, incidentally, the plane receives a really good air test before it reaches the customer. There is no reason why several manufacturing companies could not operate the same packing establishment, and thus permit each to obtain the benefits of something which might not be profitable for him to conduct alone.

The Advantages *of* Selling *the* Foreign Markets

By Hon. William P. MacCracken, Jr.
Assistant Secretary of Commerce for Aeronautics

MUCH has been written about the value of international long distance flights by our airmen in promoting goodwill and foreign trade in general, but little attention has been given by our aircraft manufacturers even to the effect of these flights upon their export market. Recently tangible results have appeared in the form of foreign orders. A Latin American country raised the money by popular subscription to purchase three cabin monoplanes of the type flown there on a pioneering goodwill flight. Prior to that time European planes were in favor in that country.

There are other instances. A middle west factory, builder of the monoplane which flew from Detroit to Tokio, sold a plane in Europe shortly after that wonderful flight. China has also become a customer, a shipment from California being now on its way. An American organization which has carried on cotton dusting by airplane in Peru for several years has already been responsible for the sale of six aircraft for use on a newly established airline. In another South American country, a prominent senator flies his own American biplane on visits to his constituency.

Although the major part of South America has not been visited by our commercial aircraft there are indications that substantial business will soon be forthcoming. Much of this interest has been unsolicited by the manufacturer, and it will wane unless efforts are taken to stimulate it. The aeronautics industry has a tremendous obligation to fulfill if the flights of our airmen are to be made more than adventurous undertakings. It should

A special Wright "Whirlwind" powered Fokker sold to the Tela Railroad Co. in Honduras. Note the third wheel in front.

be considered a duty on the part of the industry to follow up these flights with intelligent salesmanship.

It is of particular significance that the American aircraft which have been before the eyes of the world because of their remarkable international flights were without exception no more than stock models with passenger space given over to gasoline tanks. These planes which were of the single engine type were made available to the airmen at prices not greatly in excess of $12,000. And they were presumably sold at a profit to the makers. The tri-engined planes used were of a type now operating on some of our air transport routes selling around $40,000 to $50,000. Figures are not available as to the prices of the foreign planes which have recently made such wonderful records. It is known, however, that with the exception of the toy-like but efficient "Moths" and "Avians," flown from England to Australia and South Africa, they could not be duplicated for less than twice as much as our aircraft would cost. This fact, which I cite not to depreciate the performances of foreign aviators and planes, is interesting from the standpoint of foreign sales. Even with high labor costs, we have learned to produce economically in this country as there are no subsidies for our factories to rely upon, and few of them have reached anything like quantity production as it is known in other industries.

Hon. Wm. P. MacCracken, Jr.

If history repeats itself and the aircraft industry continues as it has started in producing efficiently and economically we should have a similar status to that of the automotive industry in respect to the proportion of American aircraft to foreign in use outside of the United States. Of course, there are factors which militate against us in certain countries such as our inability to sell where aircraft industries are subsidized by Governments for military reasons. The entry of our quality aircraft at a low first cost and subsequent economy of operation will be as beneficial to the consumer as it is to the producer; if this does not follow the producer does not long occupy a place in the domestic or foreign market.

The aeronautic industry is gradually becoming aware of the advantages which may be derived from business

with foreign countries, but there is still much to be desired. The industry realizes, perhaps, that the prestige attained by having a product made in Wichita in efficient use in Alaska will react favorably upon the sale of that product at home. But few in the industry give credence to the major consideration. Why is an export trade in aircraft desirable? This question is ably answered by Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce of the Department of Commerce,

A shipment of Huff Daland Dusters leaving the factory at Monroe, La., for Callao, Peru.

which organization is charged with developing foreign trade for American producers.

"An export trade in aeronautic products will enlarge and stabilize the production of those products with consequent savings in cost to the users and increased earnings for the makers. Market diversification through foreign sales stabilizes demand which in most lines of trade is subject to seasonal fluctuations.

"Among the most successful American industries are those which have a good proportion of their business with foreign countries. For example, the ten to fifteen per cent. of automobile production which goes abroad may very possibly result in that margin of profitable stability in the industry which means low prices and thus enables many of us to own an automobile who could not otherwise. Coincidentally, automobiles could not be marketed in certain countries were it not for economies of production made possible by balanced demand resulting from wide-spread foreign business.

60 *Per Cent. Foreign Business*

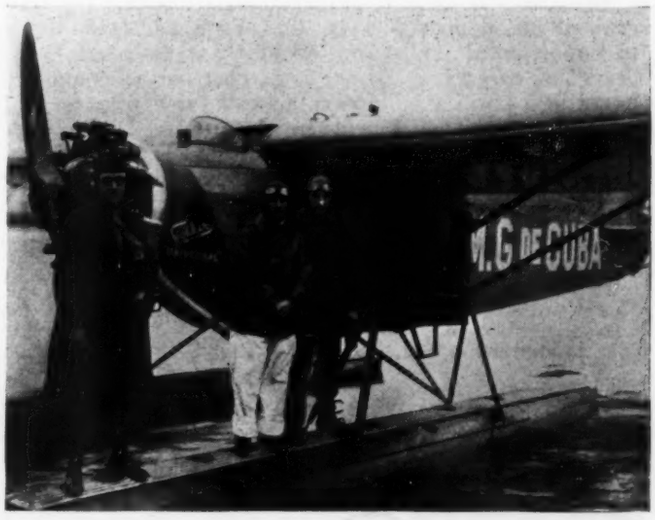
"One American industry might not now be in existence if it were not for the fact that sixty per cent of its production is exported. The foreign business amounting to sixty per cent. enables the industry to sell the remainder of its production here which it could not price low enough to sell because of the competition afforded by a different product having a similar use. By reversing this picture —which applies to the motor cycle industry—one can realize the advantages of an export trade to a specific industry. The manufacturer who makes 300 airplanes a year and sells only 30 overseas is insured to the extent of 10 per cent. against a domestic slump providing of course that he can duplicate that business the year following. If he deals intelligently and fairly with his foreign customers he should with little difficulty increase his foreign sales each year."

Airplane factories are springing up all over the country. Those that have been in business for several years are increasing their facilities. The Census Bureau mentions only 61 firms as producing 1,875 airplanes and 105 seaplanes and amphibians during 1927. How many of these 61 factories made more than ten aircraft during that year? It may be presumed safely that fifty per cent. of this production was put out by ten firms. What of the 51 other producers, or of a similar number of new organizations entering the field this year? Will they be in business two years from now? If they are, what percentage of their products will be sold in the United States, and what percentage will be sold abroad. Few of either class have ever exported and the majority, apparently, do not even take the trouble to answer inquiries received from foreign countries. They are too busy with current domestic business or physically handicapped by the lack of engines, or equipment, to give proper attention to export trade. While in the meantime their competitors, both domestic and foreign, are explaining the reason for their inability to deliver or are submitting quotations and offering to make deliveries for export regardless of domestic demand.

An Advantage to the Operator

It seems to me that it will be of great advantage, not only to the manufacturer but to the operator both at home and abroad if the former spreads his marketing area outside the United States. The operator in this country will profit in that his needs will be met at lower costs, and if he engages in international operations he will get better service abroad if the type of plane he uses is sold there. In this connection, the ledger experiences of our airline and air services, operators could profitably be made available to the foreign operator using similar equipment.

With the need for air services to supplement the existing inadequate transportation facilities of many foreign countries, and for the inauguration of services to isolated sections, there seems to be an excellent opportunity for American aircraft manufacturers to export. The aircraft firms that are energetically seeking foreign markets are few, and it is significant that those few are among the most progressive from the standpoint of manufacturing methods and management. The Department of Commerce, through its Bureau of Foreign and Domestic Commerce, stands ready to serve all the manufacturers who are desirous of expanding their markets beyond our national borders.



Dr. C. M. Marquez, Capt. E. La Borde, Cuban Air Corps, and C. B. D. Collyer on the float of a Fokker Universal seaplane of the Cuban Naval Air Corps.

Government Assistance *for* Aeronautic Exporters

By LEIGHTON W. ROGERS
Chief, Aeronautics and Communications Sections, United States Bureau of Foreign and Domestic Commerce

A YOUNG industry, such as the group of aeronautic firms that have been in existance only a few years is invariably reluctant to take steps to increase its business through the medium of foreign sales. Import duties, special export crating, consular fees, the documentation involved and the matter of collections are thought of as insurmountable barriers to anyone but the experienced. As a matter of fact, a transaction with a foreign customer need not be involved and may be almost as expeditiously handled as one with a neighbor. Import duties, if any, are absorbed by the customer; crating is a problem for a carpenter guided by blue prints; and supervised by a competent engineer; consular formalities and documentation may be handled easily within the organization or by an agent at low cost; and the matter of payment or credit is one of receiving cash before shipment or granting credit after careful investigation and consultation with bankers.

An American aircraft producer whose product has been granted an Approved Type Certificate and who wants to export need not worry about these so-called "bugbears" of exporting. If the local chamber of commerce is not in a position to answer his call for assistance, that organization can tell him where the nearest District Office of the U. S. Bureau of Foreign and Domestic Commerce is located. There he may receive advice as to the procedure necessary in order to join the envied group

A line-up of Huff Daland Dusters at Lima, Peru, February, 1927. The man at the left of the three is H. R. Harris, in charge of operations.

of exporters, to which most members of the machinery, automotive, textile and chemical industries have belonged for more than a decade. The assistance given by these twenty-four offices, or the forty-eight cooperative offices located in chambers of commerce is not paternal but specific and practical.

The primary function of this highly organized Bureau has been to point the way toward successful exporting and to do so without duplicating the work accomplished or being carried out by other organizations. The missionary work of helping American industry in general to take on an international aspect has been pretty well completed and the Bureau has recently entered more extensively than heretofore into domestic activities such as the important problem of distribution costs and the elimination of unnecessary and costly sizes and containers.

One of the four "Wasp" powered Fairchild cabin monoplanes to be used on the Montreal, Canada, to New York City mail and passenger route, Canadian Colonial Airways.

The aeronautic industry however will need some assistance in establishing itself in the world market.

For this purpose a Foreign Aeronautics Section has been established in the Transportation Division of the Bureau headquarters at Washington, which section acts as the heart of the aircraft foreign trade promotional work of the Department of Commerce. It functions in the same way that the Automotive Division does for the automotive industry, the Industrial Machinery Division for its group and in a way similar to the other fifteen commodity divisions which are studying foreign marketing conditions and through the foreign offices seeking outlets for their respective industries. The material which comes in from the fifty-five foreign offices of the Department of Commerce and the 500 consular offices of the Department of State, located where the Department of Commerce does not maintain branches, is digested and disseminated to the industry through its domestic offices. Nothing is filed and forgotten which would be of value; the industry being kept advised of any foreign development of importance or possible interest. Another service, and an important one is that in connection with opportunities for the sale of American aeronautic products which come to the attention of foreign representatives of the Department of State and Commerce.

An example of how trade opportunities initiated by these men result in business for our factories occurred recently in a Latin American country. The United States Government representative cabled to the effect that several commercial planes were to be purchased and that unless quotations and complete descriptive data were

in his hands by a certain date, the business would very probably go to a foreign manufacturer.

Immediately upon receipt of the cable the Foreign Aeronautics Section wired to all the manufacturers of the particular type of plane desired. The wires suggested that air mail be used to reach a certain steamer. After the receipt of this information from all the manufacturers interested in the business the Government representative sent a cable asking for a return cable giving an advisory opinion as to the best model of plane for which he had received quotations and other data. He intimated that unless an advisory opinion could be given there was danger of losing the business for United States producers. Of course an advisory opinion could not be given by the Department of Commerce. Instead a cable was despatched to the effect that performance data, as reported to the Department by the manufacturers, was being sent. It was suggested that if a choice could not be made with them as a basis, price be the deciding factor . Evidently this suggestion was acted upon as recently an American firm closed with the foreign customer. No charge whatsoever is made for such services rendered by the Department of Commerce.

Other Means of Service

This instance is cited as a practical example of how the Government can aid the exporter and do so impartially, rendering equal assistance to firms both small and large. There are other means by which it can be of service. More prosaic trade opportunities than the one mentioned come in regularly through the mails and are disseminated to responsible American firms through the Domestic offices of the Bureau. A firm in Uruguay wants the agency for a low priced open cock-pit plane; a manufacturer's representative wants to handle on a commission basis a similar type of plane in Johannesburg. These two opportunities and similar ones are now open to any manufacturer whose capital is at least 51 per cent. American and whose plane has an approved type certificate from the Aeronautics Branch.

The Aeronautics Branch by the way cooperates very closely with the Section of the Bureau of Foreign and Domestic Commerce which has to do with the promotion of aeronautic sales in foreign countries. And naturally there is a continuous exchange of information between the two branches of the Department of Commerce. Some of the Bureau offices in this country have been designated temporarily as headquarters for the Branch inspectors.

In regard to the technique of exporting it was mentioned before that questions on the subject are answered expeditiously by the Domestic offices. These offices are staffed by men who have had many years of experience in foreign trade either in private business or as Com-

A Keystone "Pronto" (Whirlwind) plane used on the Lima-Iquitos, Peru, line of the Peruvian Naval Air Service.

mercial Attaches or Trade Commissioners of the Department of Commerce in foreign countries.

It is not the purpose of these men to act as export brokers but merely to advise the manufacturing exporter or potential exporter as to the *modus operandi* to suggest ways and means i.e. where the latter may obtain the services of a reliable freight forwarder, where foreign consuls are located, where information may be obtained on foreign firms asking for credit and where to obtain information which would enable the manufacturer to quote "C.I.F." in compliance with the desire of the potential customer where specifications for export crates may be obtained. The staffs of these offices may be of material assistance in the interpretation of information obtained from outside sources.

Any questions relating to foreign trade are welcome, and if these have not been anticipated or for other reasons can not be answered immediately the domestic office is in touch with the Aeronautics Section and the technical units of the Bureau such as the Commercial Laws Division, the Division of Foreign Tariffs, the Packing, Shipping and Railway Sections of the Transportation Division, and the Commercial Intelligence Division. The last mentioned has reports on approximately 750,000 foreign firms giving details as to lines handled, how long

(*Continued on page* 1056)

An order of Consolidated NY-2 planes ready for shipment to Brazil, S. A.

Proper Packing Methods *for* Export

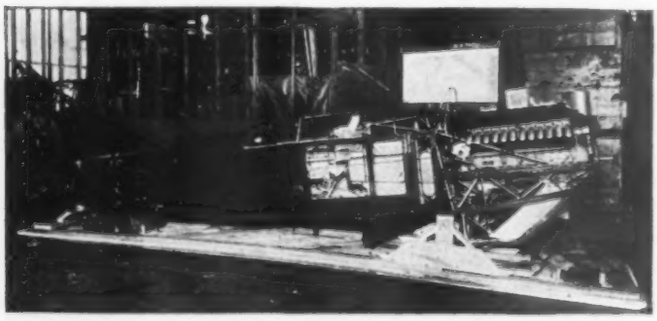
By THOMAS E. LYONS
Chief, Packing and Material Handling Section, Transportation Division, Bureau of Foreign and Domestic Commerce

DURING the first five months of 1928 the United States exported aeronautical products valued at $1,461,000. If these figures can be used as a criterion, the export figures for the first six months of 1928 will equal, and possibly exceed, the entire sales for the year 1927, when the United States shipped abroad $1,903,000 worth of aeronautical equipment, and which was a record year in this rapidly growing industry.

The rapid development of sales in aeronautical equipment in export markets and the possibilities of further extension has caused manufacturers to give serious consideration to the many difficulties which must be overcome in making prompt and satisfactory delivery when once an order is received.

The recent performances of American planes in national and transoceanic flights have drawn the attention of foreign buyers to the efficiency of design and construction of American airplanes, and inquiries from potential buyers and agents are coming to the United States as a result of these flights. The problem of delivery of planes abroad, however, is entirely different from that of delivery within the United States.

Naturally, the foreign buyer is interested in the "c.i.f." price he must pay for his flying equipment. Therefore, in quoting prices American manufacturers should take advantage of every opportunity tending to reduce handling and transportation charges. While efficient packing is an essential requirement, any unnecessary packing material or dimensions serving to increase transportation or handling charges adds just that much to the ultimate cost of the plane to the foreign buyer.



Showing the method of anchoring a "Hawk" to the flooring of a shipping case. (Curtiss photo.)

At the present stage of development of aviation it is difficult for American manufacturers of aeronautical equipment to adopt standard production methods tending to reduce unit costs as employed in other industries. It is, however, possible for American manufacturers of such equipment to adopt efficient distribution methods. One important factor in distribution costs which can be controlled by the shipper is that of packing. Experienced shippers have long since learned that efficient packing can be accomplished in many cases at a cost lower than inefficient packing, and, by scientific designing of shipping containers and careful studying of the possibilities of dismantling of set-up equipment, shipments can be made at less cost and with greater security than improperly packed merchandise. Of the many diversified commodities which enter into our export trade none presents a more difficult packing problem than airplanes. Due to their unusual size and the necessity for adequate protection, experienced exporters have given considerable attention to the packing and shipping of aircraft.

Thomas E. Lyons

As ocean freight rates for commodities of this nature are usually based on cubical measurement, it is essential that cases of aeronautical material be designed to occupy the least possible space. Some manufacturers are constructing their machines intended for export with a view of permitting them to be easily dismantled into compact shipping units and at the same time requiring a minimum of effort and skill for reassembling when the machines are to be set up abroad.

During the late war a large manufacturer and exporter of airplanes and flying boats encountered several peculiar and unusual problems in making export shipments, chief of which, perhaps, was guarding against the buckling of long and comparatively light cases in the process of loading and unloading. Realizing this condition must be overcome if planes were to be handled safely, the engineering staff of this company engaged in a series of researches and experiments, looking to the solving of the serious problem of staying and supporting these long and light cases against buckling.

After many experimental shipments, this manufac-

Two planes being moved by truck to steamship piers for export. Note the unusual length of panel box on first truck, necessitating a trailer. (Curtiss photo.)

turer states that with the efficient methods of packing and bracing developed as a result of many tests, shipments have been made to many parts of the world with no reports of damage to planes while in transit. In preparing export shipments this manufacturer employs the following method:

The machine is first dismantled into three separate units, fuselage, wings and elevators, and pontoons.

The landing wheels are removed and securely fastened to the flooring of the case, one beneath the engine and the other under the cockpit of the fuselage, and are bound by steel strapping of 1½ in. width. The axles of the landing gear are cradled to bed of case by two 3 in. x 8 in. maple blocks, resting on ends at each spindle. These blocks are held in an upright position by diagonal braces 4 x 4 in., which are anchored by eight inch lag screws, both to the floor blocking and to the upright. To prevent spreading a one half inch rod is run through the entire length of the axles and bolted to the maple blocks. A four inch square steel plate is placed at each end of the rod to give additional rigidity. The propeller is bolted to the flooring of the box by a single bolt running through the hub. The flooring of the case is constructed of double one half ship-lap spruce, between which waterproof paper is placed, and one wall of which is straight and the other laid at 45 deg. angles. The flooring is mounted on three 2 x 4's beveled at the ends and forming a skid. Stringers of 2 x 4 in. pine are run the full length of sides and ends and are set in from the edges to permit sides and ends to be nailed and bolted securely into place. Six-inch screw bolts placed two inches apart are employed to secure sides and end walls to stringers.

Tail Anchored to Spruce Piece

The tail of the plane is anchored to a piece of 2 x 8 in. spruce, running the entire width of the case and which is in turn bolted through the bottom of case and into skids with two one half inch bolts at each end. The heads of the bolts are counter-sunk in the skid members to permit easy movement of the case. A built-up block of 2 x 8 x 10 in. lumber, on which rubber discs have been placed, serves to support bottom of tail and eliminate shock on this part of fuselage. A 2 x 10 in. iron plate is strapped to the 2 x 8 in. spruce with a one half inch tie rod which firmly anchors tail of plane to floor. The sides, ends and top are built of same material, double thickness, and the top has 2 x 4 in. stringers, fitted near edges to permit nailing and the use of screw bolts.

The floor of this case is constructed of two-ply, one half inch spruce, built on a skid of four 2 x 4's running entire length of case and beveled at ends. The unusual length of this case—32 ft.—requires interior stiffening, which is accomplished by running 2 x 4 in. diagonal braces every four feet from each side of case at both top and bottom. The panels and tail surfaces are separated from one another by ten cross pieces at various intervals within the case. These cross pieces also serve to stiffen the side walls and are covered with burlapped felt to prevent chafing. One-half inch double thickness spruce, shiplapped and running at 45 deg. angles, with waterproof kraft paper between the laps, is used entirely in the construction of the case. Six-penny cement-coated nails are used for securing the side walls, while ten-penny nails are employed for the bracing. 1 x 4 in. supports are run the entire length at top and bottom of side walls and six inch lag screws are spaced every two feet locking the side walls to the 2 x 4 in. pine framework which has been placed on the inner sides of the top and bottom of the case. To provide additional rigidity six diagonals of 1 x 4 in. material are placed on each side. The ends have four 1 x 4 in. cleats with diagonals running both ways. The diagonals are of the same thickness of material as the cleats. The case is ventilated at the lower corner with

Panel box with top ready to go in place. Note outside diagonals and inner braces to prevent buckling. (Curtiss photo.)

a two inch hole over which wire netting has been placed to prevent rodents from entering.

The case containing the pontoon, handling truck and wing floats is built on a skid having four 2 x 4 in. members running entire length of case and beveled at ends. The box is of doubled-wall construction, one of which is diagonal, of shiplapped spruce, one half inch stock, between which waterproof kraft paper is placed. The handling truck is raised off wheels and blocked with 2 x 4 in. spruce, bolted into position and held by two cross

(*Continued on page* 1046)

Airlines Outside *of the* United States

By BROWER V. YORK
Aeronautics and Communications Section, Transportation Division, Bureau of Foreign and Domestic Commerce

AN outstanding advantage of air transportation over other means of carriage is its speed. This is hardly worth while between two cities half an hour apart, and well served by surface transportation facilities, but its value increases progressively as the distance broadens. That is why the more important air services in Europe are over two or more countries, and the principal new services abroad are between countries and continents.

The principal transportation and communication services, outside those in the United States are largely international in character. Since progress is measured by the development of means of and services for transportation and communication, it is of the greatest importance to the whole world that air transportation has made its momentous contribution. It has more than doubled the speed by which we may travel or send our correspondence and goods. The greatest quarter century period of transportation development started with the flight at Kitty Hawk.

Regular air services have been developed almost entirely since the Great War, and they are maintained now over nearly 65,000 mi. of routes. About half of these are international lines, and 15,000 mi. are internal routes in the United States. Germany has some 10,000 mi. of internal lines, and Australia over 3,500 mi. of such services. Services under the British, French, Netherland, Danish, Swedish, Finnish, Czechoslovak, Swiss and Austrian flags are almost all over international routes.

Launching a Keystone "Pronto" (Whirlwind) fitted with pontoons for service on the Lima to Iquitos, Peru, airline.

Outside the United States, the air traffic is heavier on international than on local routes. Of course there is important carriage of passengers and goods between the principal cities in Germany, over the Australian lines, the "Scadta" lines in Colombia, and the "Sabena" lines in the Belgian Congo. But the leading lines of air traffic in foreign countries, are between London and Paris, London, Rotterdam, Amsterdam, Hamburg, Copenhagen and Malmo, Rotterdam and Berlin, Berlin and Moscow, Paris, Prague, Warsaw, Vienna, Budapest, Belgrade, Sofia, Bucharest and Constantinople, Berlin, Prague and Vienna, Barcelona, Madrid and Lisbon, Paris and Casablanca and Cairo and Basra.

Brower V. York

An important company in the transportation world is the Royal Air Navigation Co. of The Hague. It was formed in 1919 by business leaders and bankers, and has maintained services between the Netherlands and neighboring countries since 1920. In 1927 the company's planes flew 817,000 mi. over the routes between Amsterdam and Rotterdam, and London, Brussels, Paris, Basel, Amsterdam, Bremen, Hamburg, Copenhagen and Malmo. They carried 12,916 passengers, 443 tons of goods and 38 tones of mail. But little of this movement was between the two Netherland airports, 40 mi. apart. This international air passenger traffic was double that of 1925, the air mail (letters) was equal to that carried by the company in the preceding seven years, the air parcel mail was three times as great as in 1926, and the increase in goods traffic was 150 tons. Cut flowers (weighing 65 tons), wearing apparel, and other valuable goods were important in the company's traffic. Their solicitors report constantly increasing success in building it up. The carrying capacity of the planes in 1926 amounted to 801 tons and 45 per cent of it was used. Forty-six per cent of the 1,009 tons capacity was taken in 1927.

The company reported for 1927, that its traffic

amounted to 1,272,000 ton-kilometers, and that the operating cost amounted to the equivalent of about 47 cents per ton km. These figures are highly favorable compared with 163,000 ton km. at $1.90 in 1922, and even 883,000 ton-kilometers at 56 cents in 1926. The company, engaged almost entirely in international air transportation work, and probably the least dependent upon a subsidy of all European air service companies, expects to increase its efficiency to a point where operating profits will result by 1934. A seven year subsidy arrangement was made with the government in 1927 on the basis of progress up to that time, and by which the subsidy is reduced each year, and will end in 1934.

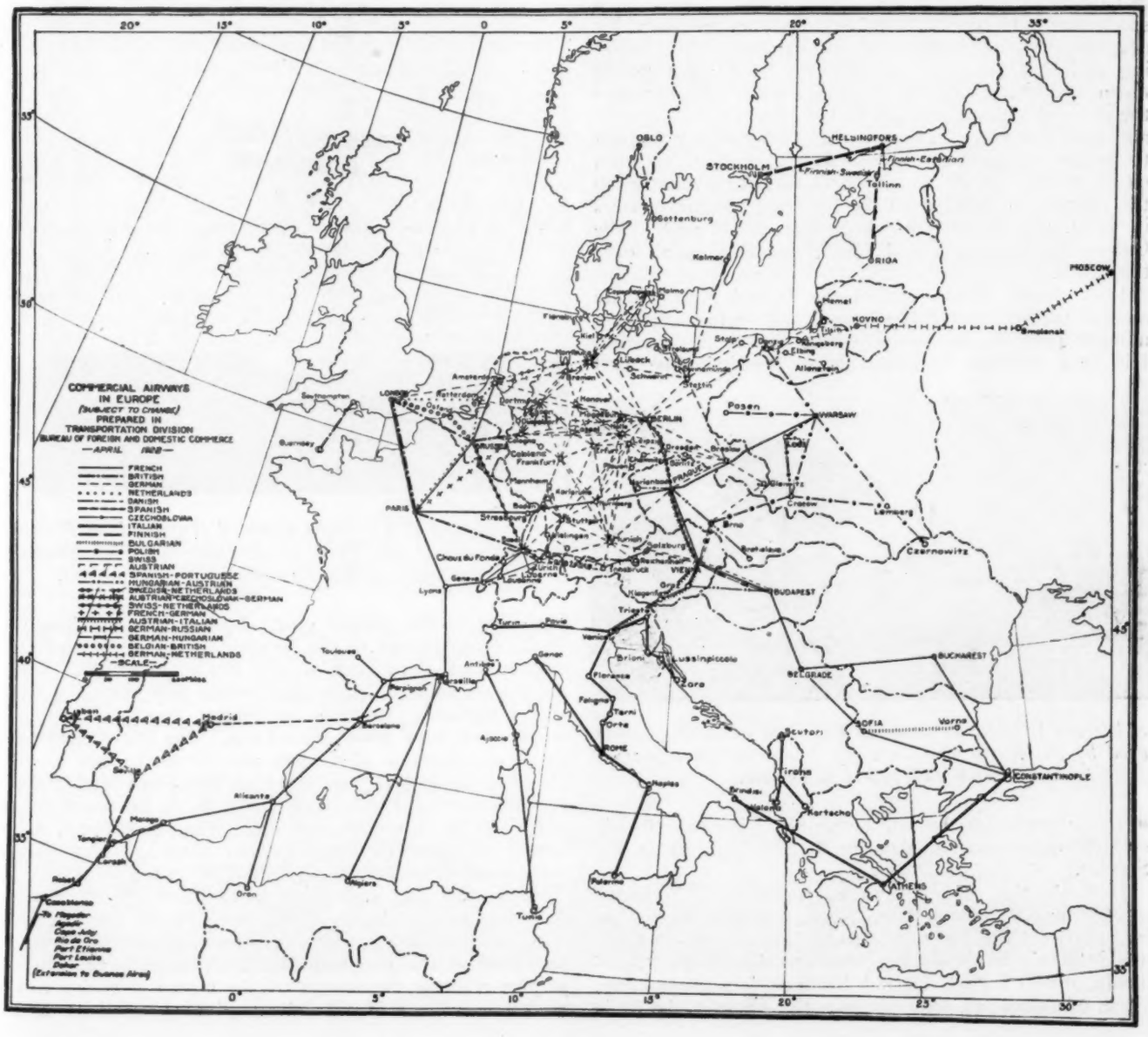
A subsidiary company has been formed for services in the Netherland East Indies. These are expected to be in operation in 1929. Several experimental flights, on which mail is being carried, are being made by the company between Amsterdam and the East Indies. A regular service over the vast distance will be available before many months pass.

Finland has an operating company which maintains services between the capital, Helsingfors and Stockholm, and between Helsingfors and Tallinn, Estonia. The flights are over water and are popular. The Swedish Air Transportation Company cooperates between Stockholm and Helsingfors. It operates between Malmo, Copenhagen, Hamburg and Amsterdam, and its planes carried, 15,000 passengers between these cities under five flags in 1927. The Swedish Flying Association is experimenting on a service to London on which night flying is done. The Danish Air Service Company has only one airport on home territory, but it maintains its place in the international competition.

Great Britain, another maritime country, boasts the Imperial Airways Ltd., which has highly organized services between seven countries. Only three of its 15 stations are in the British Isles. Its planes flew 769,000 mi. on European routes, and carried 19,000 passengers and 600 tons of goods over them in 1927. They made 43 per cent of the flights, and carried 57 per cent of the 29,000 passengers who flew across the Channel. Creditable progress is being made by the company in its Cairo to Bagdad and Basra service and an extension to Karachi, India, is promised for next April. Inter-commonwealth services are in the making. The two large airships building in England are destined to ply between England and India and Africa.

Austria has a small area but she has an air transportation company. It is necessary here again to operate in connection with foreign companies and across boundaries. Switzerland is served by British, French, Ger-

(*Continued on page* 1042)



Our Aircraft *in* Foreign Operation

By FOWLER W. BARKER
Aeronautics and Communications Section,
Bureau of Foreign and Domestic Commerce

THE efficiency and stamina of United States airplanes have recently been demonstrated by their operation in foreign countries. It is not surprising that the standard Army plane capable of doing an outside loop should make a favorable impression in South America. It was somewhat of a surprise, however, to learn that the same type of plane flew without a stop from Asuncion, Paraguay to Rio de Janiero, Brazil.

This flight was made by Lieut. James Doolittle in a single seater Curtiss "Hawk" who did not announce his destination upon taking off from Asuncion. Upon arriving at Rio de Janiero 7 hr. 30 min. later, after having flown approximately 950 mi. it was difficult to convince the spectators that the flight had been made in that time and from that point. Lieutenant Doolittle, who is thought to be the first pilot to execute an outside loop has been on leave from the Army Air Corps and has demonstrated two Curtiss models before the heads of the air services in Peru, Chile, Uruguay, Argentina and Brazil. The Curtiss Company has sold planes and engines all over the world.

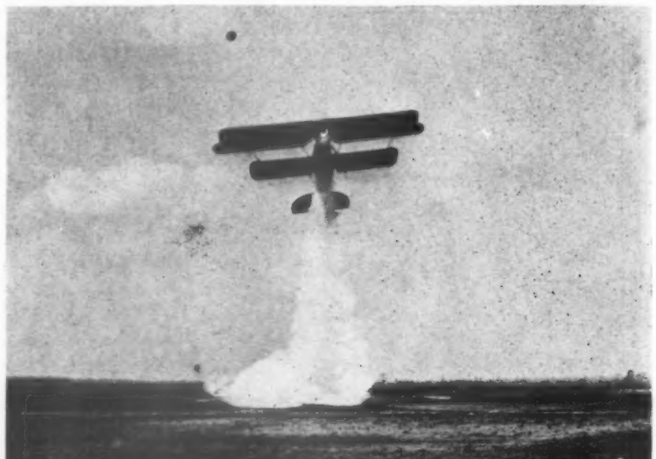
Lieut. Leigh Wade, one of the United States Army airmen to fly around the world, also demonstrated a military plane in the various South American countries. His plane was of the Consolidated "Husky" type used

A Wright Whirlwind powered Fairchild cabin monoplane used by the Royal Canadian Air Force for photographic work and patrol work, etc.

in this country for training purposes. Lieutenant Wade sold the demonstration plane to the Peruvian Army Air Service.

Probably the most interesting activity of American aircraft outside of the United States is that carried on in Peru by Huff Daland Dusters, Inc. A recent flight made by C. E. Woolman, vice-president, and "Dan" Tobin, pilot of Huff Daland Dusters, Inc. from Lima, Peru, to Guayaquil, Ecuador, was the second to be made between these two important cities and was actually the first time that a passenger and mail have been carried by airplane between the two countries. The actual time consumed was eight and one-half hours as contrasted to a journey of five days which would ordinarily be required by coastwise vessels.

Another development in Peru is that of the Iquitos-San Ramon Air Service which has been in operation since the



Action picture of a Wright powered Huff Daland Duster in operation at Lima, Peru. These planes have also proved of great value in dusting work in other countries.

beginning of the present year. Iquitos is a city located on the headquarters of the Amazon River in the eastern provinces of Peru close to the Brazilian border. The regular air mail and passenger service now operating has placed this city, formerly so remote from civilization, within three days' travel from Lima. The line is operated under the direction of Commander Grow, former U. S. Naval aviation and now chief of the Army and Navy Air Services of Peru. The airplanes in use were supplied by the Keystone Aircraft Corp. of Bristol, Pa. parent company of Huff Daland Dusters, Inc. The planes are powered by Wright "Whirlwind" engines. This company has had planes in South America for the past two years. Much of the enthusiasm for aircraft which is to be seen in Peru has resulted from the various activities of the company there. The crop protection service wherein the insects of the cotton crop are controlled by means of the "dusting" of plantations with

insecticide has become the accepted method whereby the large Peruvian plantations are protected. This method has proven to be of great economic importance in South America as in this country. It has been estimated that in this service one plane does the work which formerly required the services of 4,000 natives.

Huff Daland Dusters, Inc. has secured concessions from the Peruvian Government for the carrying of mail and this service is shortly to be inaugurated. The air mail line will be under the personal direction of Capt. Harold R. Harris, A. C. R., formerly Chief Test Pilot, U. S. Army. Captain Harris, who is vice-president of the company has been associated with the company since 1925 when he was granted a leave of absence from the Army to supervise the dusting operations.

Elmer Fawcett, who has been operating an air taxi service in Peru for several years, has ordered a number of Stinson monoplanes for use in that business and on scheduled operations for which it is understood that he has received government concessions.

Many Fairchild Planes Used

The Fairchild Aviation Co. has many of its planes in operation throughout the world. Capt. George Rihl, an oil man in Mexico, uses Fairchild cabin monoplanes on the line between Mexico City and Tampico. This organization, known as the Compaina de Aviacion, makes the round trip three times a week and its planes have been carrying mail for about six months. The carrying of payrolls is an important part of this company's business. The present equipment consists of one 220 hp. Whirlwind and one 425 hp. Wasp powered plane. It is reported that several Wasp powered monoplanes are on order from the Fairchild Company.

Richard Depew, sales manager and vice president of the Fairchild Company, reports that there are approximately 50 Fairchild All-Purpose planes in Canada, where one half that amount are used by the Royal Canadian Air Force. Canadian Vickers, Ltd., at Montreal has arranged for the manufacture of Fairchild planes under license. The first airplane to reach the German and Irish transatlantic fliers at Greenley Island was a Fairchild piloted by "Duke" Schiller. The versatility of Fairchild monoplanes, with their folding wings to save hangar space, is demonstrated by the fact that pontoons, skiis and the standard wheel landing gears are used on them in Canada. The Aviation Corporation of Cuba, the Argentine Government and Huff Daland Dusters of Peru are recent purchasers of Fairchilds. "Art" Goebel and Ernest Robinson, vice president of the Fairchild Camera organization, demonstrated a Fairchild in Japan early this year.

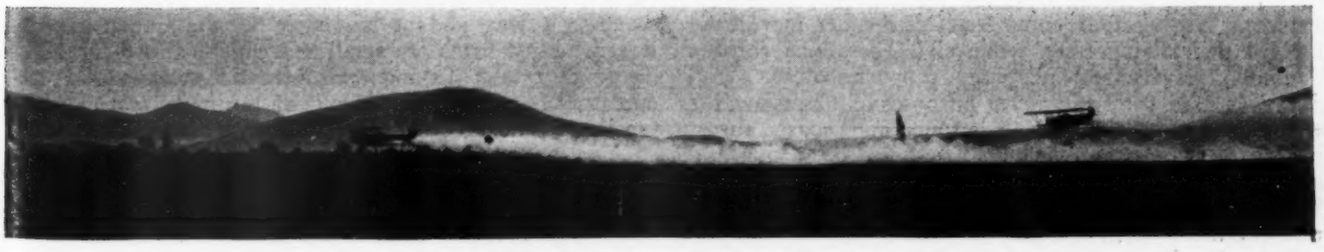
The Boeing Aircraft Co. of Seattle, Wash., has become initiated into the ranks of exporters. Capt. Ralph O'Niell, World War ace and former chief instructor for the Mexican Air Service, flew a Boeing single seater before the government authorities of Brazil. Captain O'Niell represents both the Boeing Company and the Pratt-Whitney Company in South America. It is expected that he will demonstrate a Boeing mail plane and a Boeing seaplane there shortly.

The Atlantic Aircraft Corp., manufacturer of Fokker planes in the United States, has, besides selling a considerable number of "Universals" in Canada, interested itself in the possibilities of Mexico as a market. Grissom E. Haynes, sales engineer for the Atlantic Company, returned several months ago from a 23,000 mi. trip of which 4,000 mi. was in Mexico. The plane used was delivered to Comdr. Richard Byrd upon completion of the trip and is of the "Super-Universal" type equipped with a Pratt-Whitney Wasp engine. Mr. Haynes is said to have crossed over the mountains at an elevation of 15,000 ft. between Guadalajara and Mexico City and did so with full gas capacity, three passengers and baggage.

G. E. Haynes, right, and Col. P. Sidar, chief pilot, Mexican Army Air Service, in front of the Wasp powered Fokker Super Universal which Mr. Haynes flew to Mexico City.

The Stinson Aircraft Co. of Northville, Mich., is said to be furnishing six monoplanes for the Mexican air mail route to connect the United States and Mexico City. Fokker tri-motors and Sikorsky amphibians are expected to be used on the Pan American Airways routes in Central America and the West Indies.

Several American planes have been in operation on the West Indies Aerial Express route from Santiago, Cuba, to San Juan, Porto Rico. One, manufactured by the Keystone Co., is of the three engine biplane type and another was a Fairchild equipped with a Whirlwind.



Two Huff Daland Dusters at work in Lima, Peru.

Export Figures *and* Trade Commissioners' Reports

Prepared by the Aeronautics and Communications Section
Bureau of Foreign and Domestic Commerce

NOT since the first export of an American aircraft, in 1909, when the Wright brothers shipped their airplane to France, has there been such growth in aircraft foreign shipments as during the first half of the current year. In that space of time 87 airplanes, at a valuation of $940,917, were exported as compared with 19 valued at $311,610 during the first six months of 1927, and 63 at $848,568 during the whole year of 1927.

The export valuation of all aircraft products, including engines, accessories and parts, was $1,688,379 during the first half of this year, or 57 per cent. greater than the valuation of such products shipped to foreign countries during the same period of the preceding year when it was $624,480.

This remarkable growth can be attributed largely to Colonel Lindbergh and others whose flights have stimulated worldwide interest in American aircraft. Another reason is that our domestic demand has been large during the last year, and aircraft production has increased even at a greater rate than exports. It is expected, however, that when the year is ended, unit exports of airplanes will exceed 10 per cent. of the production which is a normal percentage for the better established industries of the country.

Canada the Principal Market

Canada remains the principal market for airplanes, being the country of destination for 34 valued at $401,143. with Argentina second; the latter being the purchaser of 18 valued at $120,950 as compared with 8 valued at $190,111 during the whole of 1927. Canada was the destination for 26 valued at $197,021 during 1927. In connection with Canada the following quotation from a recent report from Assistant Trade Commissioner A. H. Thiemans, attached to the office of the American Commercial Attache at Ottawa, will be of interest as an indication of why that country is so important as a market:

"Flying in Canada has been used primarily as an improved method of observation, although of late more and more attention is being accorded air mail and passenger services. During 1927 commercial companies more than doubled their flying time, while civil operations for the Dominion Government increased proportionately. Aircraft was used for such varied purposes as observing for the sealing fleets off the Newfoundland coast, forest dusting in Cape Breton Island, forest fire protection and fisheries patrol in the far west, observation of ice conditions throughout the winter in Hudson Straits, transportation in the Yukon, and for air mail service.

"Recently a heavy demand for light air craft has been noted. The De Havilland 'Moth' has proved popular, and in 1927 the Ontario Provincial Air Service purchased four seaplanes of this type for fire detection patrols in Northern Ontario. Since that time these planes have been purchased in larger quantities. The 1927 report on Civil Aviation in Canada states that more than 70 light planes are in use or on order for fire detection patrols, and light transportation in Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, as well as for flying club and private use throughout the Dominion. The Department of National Defense has encouraged the formation of light airplane clubs and associations by furnishing

Harold R. Harris, official in charge of dusting operations in Peru, ready to take off in a Huff Daland Duster.

such organizations with airplanes. There have been large imports from the United States of cabin monoplanes built around the Wright 'Whirlwind' engine. These planes are used for transportation purposes in the north country.

"Few individuals and firms operating aircraft in Canada carry insurance on either their planes or passengers, it was said at the office of the Canadian Air Board. Most firms are small and cannot afford the high insurance rates. Taking their own risks, some of these operators have been forced out of business by accidents. On the other hand, the larger firms carry insurance, and as aviation expands there may be a good opportunity here for American insurance companies.

"Several Canadian companies are engaged in the manufacture of aircraft. One of the most important of these is Canada Vickers, Ltd., whose output during the past year included 3 Varunas, a fire suppression flying boat;

7 Vedeties, a three-seater flying boat specially built for forest sketching, light transportation, and aerial photography; 12 Avro training machines; and 5 Viking hulls. A great deal of repair and reconditioning work is done for commercial firms by the Canadian Vickers Company. An arrangement also exists with an American manufacturer whereby each firm may build, under license, the aircraft of the other's design; and consequently a number of cabin monoplanes are being constructed by the Montreal company.

The De Havilland Company maintains a branch at Toronto for the construction of its planes, particularly the Moth which is in wide demand for flying clubs, patrol work, and the like. The Ottawa Car Manufacturing Co. at Ottawa has contracts for the reconditioning of standard Avro training machines and for the construction of floats and other aircraft parts in their shops. They also have a working arrangement with an American company for the assembly and service of the latter's products, and are the Canadian representatives, moreover, of Armstrong Siddeley Motors, Ltd."

29 Planes for Latin America

The Latin-American market showed a strengthening insofar as United States aircraft purchases were concerned, that section being the destination during the first half of 1928 for 29 of the 87 planes exported.

The recent missions of United States pilots and planes which have covered the countries to the south have been largely responsible for these sales. This fact is illustrated in the following abstract from a report covering the situation in Mexico by American Commercial Attache George Wythe at Mexico City:

"During the period of the last year, and more particularly since the visit of Colonel Lindbergh from December 14 to 28, 1927, there has been a tremendous interest in aviation in Mexico which has reached many classes. Apparently, Mexico officials, as well as the public generally, have taken to heart what Colonel Lindbergh stated during his visit here, namely, that Mexico is particularly suited to commercial aviation on account of the large distances, coupled with the scant development of transportation facilities. For example, the States of Yucatan, Campeche and Tabasco have no rail or highway connection with the rest of Mexico and can only be reached by somewhat irregular shipping service. In fact, at the present time, the cities of Yucatan have better connections and closer commercial relations with the United States than with the rest of Mexico. For some time, the Government has been anxious to overcome this tendency to separatism by establishing air transportation between Mexico City or Vera Cruz and the principal commercial centers of the southeastern states.

"Another example of the exceptional advantages offered by aviation in Mexico is the fact that the trip can be made from Mexico City to Tampico in only two or three hours by plane, while it requires over 27 hr. by rail.

"The outstanding development during the present year has been the announcement of the intention of the Federal Government to establish an air mail service from Mexico City to the Texas border at Nuevo Laredo, connecting with the United States air mail service at that point. An executive decree of January 21, 1928, increased the postal rates on first class mail for the purpose of creating a fund with which to establish this service. It is announced that six planes, manufactured in the United States, have been ordered for use in establishing this service. The Mexican Aviation Co. which is financed largely with American capital now has a contract with the Government for carrying the mails between Mexico City, Tuxpan and Tampico. This service was inaugurated on April 15, 1928.

Mrs. Lindbergh's Trip Helped

"The trip which Mrs. Lindbergh made from her home in Detroit to Mexico City in an American plane to spend Christmas with her famous son, as a guest of Ambassador Morrow, and later, in July, 1928, the exhibition trip of the American-built plane to be used by Commander Byrd on his South Pole expedition increased the public interest in aeronautical matters."

Three demonstrating missions have been sent to South America by United States aircraft manufacturers, and although the business obtained to-date has not been large, it is expected that the expenses will be justified, especially as the aircraft demonstrated seems to have made a profound impression upon potential purchasers in the countries to the South. One flight from Asuncion in Paraguay to Rio de Janeiro, a distance of about 950 mi., was accomplished in seven hours and twenty minutes, and

(*Continued on page* 1038)

UNITED STATES EXPORTS OF AIRCRAFT ENGINES

Countries of Destination	*Calendar Years* 1926 No.	1926 Value	1927 No.	1927 Value	*First 6 Months* 1928 No.	1928 Value
Canada	23	22,734	31	105,504	19	38,195
China	..	.....	..	.....	5	38,900
Germany	2	9,639	7	76,508	6	24,886
Argentina	1	335	1	5,016	7	23,315
Netherlands	..	.....	1	2,550	5	22,836
Denmark	..	.....	..	.....	1	19,345
Japan	1	600	5	28,193	3	11,781
Belgium	..	.....	5	71,103	1	10,000
Mexico	..	.....	2	21,088	3	8,765
France	..	.....	1	4,610	3	6,223
Sweden	30	6,951	..	.....	1	4,611
Poland & Danzig	..	.....	1	4,260	1	3,574
Spain	..	.....	1	4,100	1	3,111
United Kingdom	33	243,042	..	.....	2	2,400
Australia	10	1,855	3	5,410	2	1,525
Italy	..	.....	..	.....	1	500
Cuba	1	85	..	.....	3	250
Panama	..	.....	..	.....	1	150
Other countries	196	288,491	26	156,533	..	.....
Total	297	573,732	84	484,875	65	220,367

UNITED STATES EXPORTS OF AIRPLANES, SEAPLANES AND AMPHIBIANS

Countries of Destination	*Calendar Years* 1926 No.	1926 Value	1927 No.	1927 Value	*First 6 Months* 1928 No.	1928 Value
Canada	9	6,116	26	197,021	34	401,143
Peru	7	90,085	8	190,111	18	120,950
Mexico	9	73,650	1	10,001	10	111,400
Brazil	1	50	1	16,239	4	63,340
Cuba	..	.....	3	14,162	4	54,887
Australia	4	5,210	3	17,441	4	13,514
Japan	..	.....	2	49,112	3	63,000
Argentina	6	29,038	1	8,875	3	42,070
Philippine Islands	4	29,578	2	40,623	2	34,500
United Kingdom	2	12,650	..	.....	2	20,000
Italy	..	.....	..	.....	1	9,950
French Oceania	..	.....	..	.....	1	6,000
Hungary	..	.....	..	.....	1	163
Other countries	8	56,772	16	304,983	..	.....
Total	50	303,149	63	848,568	87	940,917

Goebel, Dake, and Holman Win L. A.-Cincinnati Races

Dole Race Winner Makes Non-Stop Flight from Mines Field in 15 Hr. 17 Min.

CINCINNATI, O.—Art Goebel flying his Wasp powered Lockhead Vega monoplane Yankee Doodle, took first place in the non-stop class C division of the Los Angeles Cincinnati Race for the Henry C. Yeiser Trophy with an official time of 15 hr. and 17 min. He arrived at Lunken Airport at 10:25 A. M., Saturday, September 22. Emil Burgin, of New York, his only competitor in the contest, was forced to abandon the race at Albuquerque, N. M., after running into a dust storm. This victory gives Goebel the first prize of $3,000 and a leg on the $5,000 gold trophy, permanent possession of which can be gained by three successive victories in this event which is to be held annually. Gobel also won the Dole prize in a race to Hawaii and holder of the non stop record from California to New York.

Dake Averaged 83.15 M. P. H.

Robert A. Dake, of Pittsburgh, flying an American Moth plane powered with a Warner "Scarab" engine, took first honors in the Class A race for planes powered with engines having less than 510 cu. in. displacement, with a flying time of 25 hr., 16 min. and 42 sec. and an average speed of 83.15 m. p. h. crossing the finish line at 2:10 P. M., Sunday September 23. The first prize for this event was $2.000. The class B group, for planes with engines with displacement ranging between 510 and 800 cu. in., was led by Charles W. "Speed" Holman winner of the Class A prize in the New York Spokane air derby last year. Holman piloted a Whirlwind powered Laird plane completing the course in 19 hr., 24 min. flying time and making an average speed on 107.98 m. p. h. He landed at 1:30 P. M., Sunday, September 23. E. E. Ballough, of Chicago, also flying a Laird plane, was the only other Class B. entrant to arrive.

Members of the Class A group were the first to start from Mines Field, Los Angeles. The race got under way at 10 A. M., Thursday, September 20 after a wait of several hours for sufficient visibility to make the start possible.

Seventeen Class A Starters

Seventeen pilots were flaged off by R. R. Blythe, official starter, and followed each other at intervals with the hope of reaching El Paso, Tex., the first control City, before nightfall. All continued on their courses with the exception of Leo Terletsky, flying a Waco plane, who found the visibility too poor for safe flying and returned to the field to wait until the fog lifted. Six of the seven Curtiss OX-5 engines in the starting planes, were equipped with replacement parts supplied by Miller Airplane Products Inc., of oLs Angeles.

The starters were: S. J. Wittman, OX-5 Pheasant No. 67; Alfred Stanley, OX-5 Waco No. 36; Albert R. Jacobs, Fisher and Jacobs engined Wavo No. 17; George Hopkins, Warner Scarab Stinson Jr. No. 141; K. E. Whyte, Circus DH Moth, No. 31; Leo Terletsky, OX-5 Waco No. 5850 Stuart Chadwick, OX-5 Waco No. 109; Theodore W. Kenyon, Warner Scarab Challenger, No. 51; Dake, Warner Scarab American Moth, No. 83; H. S. Myres, Kinner K-5 Simplex Red Arrow, No. 57; Daniel A. Kundle, OX-5 Travel Air, No. 168; A. H. Kreider, OX-5 Challenger, No. 93; W. H. Emery, Jr., Warner Scarab Travel Air, No. 20; Eugene Detmer, OX-5 Travel Air, No. 27; J. S. Charles, Eaglerock, No. 8; A. K. Owen, Fleetwing No. 3621, and Emanuel Turner, Berliner, No. 71080. The last two delayed in starting by engine trouble.

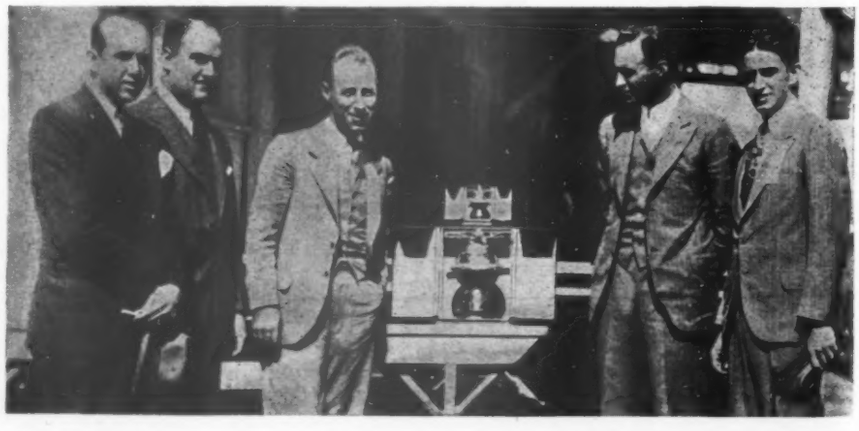
Class B Start Delayed

The Class B. take off was also delayed by fog until 10 A. M., Friday, September 21, the day set for the start. Only four of the six entries were on hand for the event. They were Lieut. Jack, Commander Iseman, U. S. N., piloting the Bellanca transatlantic monoplane Columbia; Balough, with Charles Dickinson of Chicago as passenger; R. T. Merritt, flying a Ryan Brougham, and Holman. Capt. Charles C. D. Collyer, piloting the Wasp powered globe circling Fairchild Monoplane, City of New York, followed the racers as relief plane.

The two Class B. entries that failed to get off were William Drury, Ontario, Canada, and S. T. Stanton, also a Canadian. El Paso was also the first overnight stop of the Class B. racers. The other night control was Pine Bluff, Ark.

Burgin was the first of the two Class C. entries to leave Mines Field. Accompanied by Capt. John Lewis Yansy, he took off at 2:56 P. M., Friday, September 21, and was not heard from until after his competitor had arrived in Cincinnati, Goebel, who was accompanied by Harry Tucker of Santa Monica, his financial backer, took off at 4:05 P. M., carrying a load of 450 gal. of gasoline.

Prizes were presented to the winners at a banquet in their honor, given Sunday night by the Chamber of Commerce. Besides the prize money Goebel received a small gold replica of the Yeiser trophy indicating that he had taken the first leg of the prize. All those landing here were given $100 by the Air Race Committee for completing the course.



Art Goebel shown with the race trophies shortly after winning the Los Angeles-Cincinnati non-stop event in his Lockheed Yankee Doodle. Left to right are C. Higbee Embry, Robert N. Olin, Harry Tucker, who accompanied Goebel, Art Goebel, and Paul Riddle.

Repair Damage To Miami Field

MIAMI, FLA.—Construction of rock runways at the airport of the Pan-American Airways, Inc., made necessary by damage to the uncompleted field by the recent storms has been started. The cost will be between $10,000 and $15,000 and will represent an additional expenditure for the Miami terminal which was not considered in the first plans.

The runways will be 200 ft. wide and will extend from the southeast to the northwest, and southwest to the northeast corners of the field. In the center of the runways and south of the hangars and new $50,000 terminal building will be a large square area to be rocked and rolled.

T.A.T. Orders 10 Ford Monoplanes

Each to Be Powered With Three 400 hp. Pratt & Whitney Wasp Engines

NEW YORK, N. Y.—Following tests by Colonel Lindbergh's technical committee of Transcontinental Air Transport, Inc., that organization has placed an initial order for aircraft equipment, it is announced. The order, according to C. H. Keys president of the company calls for delivery of 10 Ford tri-engined planes powered with Pratt & Whitney Wasp engines by February 1. The cost of these planes with spares and acessories is approximately $800,000.

Complete details of interior arrangements and fittings are being worked out. The planes will have a capacity of 12 passengers, together with baggage, full radio equipment, etc. Top speed is approximately 135 m. p. h.; crusing speed about 115 m. p. h.

The airplane, according to the result of tests made by the company's experts, flies very well on two engines, which affords the widest possible element of safety.

L. W. Rogers to Direct World Air Conference

WASHINGTON D. C.—Leighton W. Rogers has been named Executive Officer of the International Civil Aeronautics Conference to be held in Washington December 12, 13 and 14, 1928, it has been announced by the State Department. He assumes his duties at once under the direction of an executive committee headed by the Assistant Secretary of Commerce for Aeronautics, William P. MacCracken, Jr.

Mr. Rogers, who has been in charge of the Division of Foreign Aeronautics and Communications of the Department of Commerce, has established headquarters in the U. S. Chamber of Commerce Building, where it is planned to hold most of the sessions of the Conference.

The Executive Officer in Charge of the first international gathering of commercial aviation interests to which 54 foreign countries have been invited by the Department of State to send delegates and guests has been a foreign service officer of the Department of Commerce for seven years. He has served in various European capitals as Commercial Attache.

Fly Small Plane in Omaha

OMAHA, NEB.—A small monoplane built by Arthur and Walter Myers recently made its first public flights at the Olson Airlines field and the municipal field. The wing span is 23 ft., it is 17½ ft. long and less than six feet high.

Voughts Sold in South America

LONG ISLAND CITY, N. Y.—That 12 Vought planes have been sold in the South American market is announced by the Chance Vought Corp. of this city. Four have been taken by the Republic of Peru, four by the Cuban Army Air Service, and four by the Argentine Navy. The company reports that it is at present working on the Corsairs ordered by the Argentine Republic.

Antarctic Trip Started By Wilkins and Eielson

NEW YORK, N. Y.—Capt. Sir George Hubert Wilkins sailed on the *S. S. Southern Cross* for Montevideo on September 22, accompanied by Carl Ben Eielson, pilot, Joseph Crossman, pilot, and Orval Porter mechanic. From Montevideo the group will take a whaler to Deception Island, the base for Wilkins' exploration over Graham Land to the Antarctic Circle.

A Lockheed Vega plane, the craft in which Wilkins and Eielson flew from Point Barrow to Green Harbor, Spitzbergen, early this year, is being taken on the expedition.

Before the final tests flights were made at Miller Field, L. I., pontoons, specially designed and built by the Fairchild Aviation Corp., were fitted to the plane by a readjustment of the stock struts used with the landing gear. Weighing 240 lb., 21 ft., 4 in. long, and re-inforced with strips of wood on the keel, the pontoons will carry the heavily-loaded plane off the water and act as emergency landing equipment should the pilot find himself forced to land on the ice.

Falcons for N. A. T.

GARDEN CITY, L. I.—Eight Curtiss Falcon planes are now under construction at the Curtiss plant here for 90 day delivery to National Air Transport, Inc. The new planes, to be used in mail service bewteen Kansas City and Chicago, are to be powered by Liberty engines, it is announced. They will carry 750 lb. of mail and will be capable of a high speed of 145 m.p.h.

St. Augustine Plans Derby

ST. AUGUSTINA, FLA.—Reports made by committeemen at the last meeting of the St. Augustine Chamber of Commerce air derby executive meeting indicated that at least 40 planes would be registered before the meet gets under way on October 6 and 7. Chairman R. L. Mason, Jr., reported that he had already received entrance applications and notifications from 18 planes in addition to government planes and parachute jumpers.

Air Conference Plans Announced

Three General Sessions to be Held at International Gathering

WASHINGTON, D. C.—A preliminary outline of the plans of the International Civil Aeronautics Conference to be held at Washington, December 12-14, inclusive, has been announced. The purpose of the conference, which is being held on the 25th anniversary of the flight of the Wright Brothers, is to provide an opportunity for an interchange of views upon problems pertaining to aircraft in international commerce and trade. Fifty-four foreign governments have been sent invitations.

As now planned the program calls for three general sessions, one on each morning of the Conference, and three separate afternoon sessions each day. There will also be an evening session December 13.

The morning sessions will be devoted to: Air Transportation, December 12; Airway Development, including meteorology and communications, December 13; and trade in aircraft and engines, December 14. Papers on these subjects, prepared by delegates and selected by the program committee, will be read at the morning sessions. They will be discussed at the afternoon sessions, along with such other topics as airports, private flying, competition, insurance, aeronautical research, aeronautical propaganda, and aerial photography.

To Honor Pioneers

One of the features of the December 13 session will be the consideration of pioneer flights. The Executive Committee is asking that fliers from all countries who have been identified with pioneering flights be present and participate. The Committee is also asking that motion pictures be brought for exhibition showing the start and other incidents connected with the pioneering flights.

Foreign delegates who arrive early enough are being invited to attend the annual aircraft exhibition of the American commercial aircraft industry to be held in Chicago December 1-8 inclusive under the auspices of the Aeronautical Chamber of Commerce. Transportation by air from New York without expense will be arranged as far as possible. On December 17 a pilgrimage will be made to Kitty Hawk, N. C., scene of the Wright Brothers' flight.

Air Meet at Portland

PORTLAND, ME.—Under the auspices of the Portland Chamber of Commerce and the Harold T. Andrews Post of the American Legion, a Portland air meet began yesterday to be completed today (September 29). Cash prizes for the meet total $4,000.

New Bach Plane Placed in Service

"Cherokee" is First of Fleet Ordered by West Coast Air Transport

PORTLAND, ORE. — The Cherokee, first of the new tri-engined Bach air yachts ordered by West Coast Air Transport, operating company for Union Air Lines, is now in service on the Portland-San Francisco run of the company. The big monoplane carried a full load of eight passengers on her maiden voyage up the coast September 20.

The plane is similar to the Cascadian and Crusader Bach air yachts with which West Coast started its Seattle-San Francisco service in March, except in power and in cabin and baggage space construction. Its nose engine is a Pratt & Whitney Wasp. The wing engines are 9 cylinder Ryan Siemens.

All the fuselage, except the pilots' cockpit and the rear baggage compartment, is thrown into one cabin, instead of cutting off the rear two seats for a smoking room. The lavatory, in the middle of the old model planes, is moved to the rear. Two baggage compartments have been let into the rear of the wings next the fuselage so as to take some of the load off the tail.

Relieves Cascadian

The Cherokee relieved the Cascadian at Mills Field, San Francisco. The latter was ferried to the Bach Aircraft Co. plant near Los Angeles to be modified along lines similar to the Cherokee. It now has 7 cylinder Ryan Siemens wing engines and a Wasp nose. The more powerful wing power plants will be installed and the cabin reconstructed to match that of the new planes. The Crusader, now powered with a Whirlwind and 7 cylinder Ryan Siemens engines, will follow to the factory as soon as the Cascadian is released or a fourth sister plane due in a week or so, arrives.

Delivery of the Cherokee was delayed by the plane's use as official airplane at the Los Angeles Exposition. Daily service between Portland and San Francisco and the inauguration of Portland-Spokane service through the Columbia gorge are awaiting arrival of the fourth plane and reconstruction of the Cascadian and Crusader.

Bach Considers New Plant

HOLLYWOOD, CALIF.—Construction of a manufacturing plant at the proposed Metropolitan Airport here is being considered by the Bach Aircraft Co., it is reported. The company plans to build two 100 by 130 ft. hangars at the field which lies northwest of North Hollywood.

Comet Awarded Certificate No. 9

WASHINGTON, D. C.—Approved engine type certificate No. 9 has been awarded to the Comet engine, according to an announcement by the Aeronautics Branch, Department of Commerce. This power plant develops 115 hp. at 1,775 r.p.m.

W.K. Neely to Organize Aero Chamber Division

WICHITA, KAN.—Wilbur K. Neely, a vice president of the Wichita chapter of the National Aeronautic Association, has been selected to organize the south central division of the Aeronautical Chamber of Commerce and to assure a large Wichita representation at the aeronautical exposition in Chicago which opens December 1. This is America's international show, to be attended by diplomats from the air services of foreign nations.

The big show in Chicago is the annual event in aeronautics in America and is now being made permanent and self-sustaining. Within the aeronautical chamber a show association has been chartered and manufacturers of the nation have absorbed the stock. Nearly every aviation industry in Wichita is now in it. The Swallow, Stearman, Travel Air and Laird factories have taken stock. Cessma and Swift have agreed to do so. All aircraft companies here will be represented at the Chicago show, Mr. Neely says, and several of the firms will exhibit more than one plane.

U.S. Chamber Plans Air Talk

WASHINGTON, D. C.—Commercial Aeronautics is among the subjects to be discussed at the Chamber of Commerce of the United States conference to be held at Hot Springs, Ark., October 5 to 9.

The conference, will be attended by national councillors, presidents and secretaries of local chambers of commerce and trade associations, members of the National Chamber's Board of Directors and principal committees. The national councillors, who are the connecting link between the National Chamber and its 1,500 member organizations, include some of the most conspicuous business and financial figures in the country.

Koerbling to Manage Schools

WICHITA KAN.—A. Koerbling has resigned as inspector of the Department of Commerce at Omaha to become field manager of the Aeronautical Schools Association in Wichita. Koerbling has been flying for the past 16 yr.

Marchetti to Produce Planes and Engines

SAN FRANCISCO, CALIF.—According to an announcement made by Marchetti Motor Patents, Inc., a tract of 100 acres adjoining Mills Field has been purchased for an emergency landing field and plant site. The company plans production of an 8 cylinder, 175 hp. radial air cooled engine and a four place all metal, enclosed, cantilever monoplane and is tooling for an output of 1,000 engines and 100 planes.

Experiments on the engine began more than seven years ago and development under laboratory conditions during the past three years has brought it to the point of manufacture. It is a cam type of engine embodying a new principle on which the company holds patents in this country and abroad. The engine is said to develop 20 per cent. greater horsepower per displacement than a crank shaft type. The weight will be approximately 2 lb. per hp.

No information is available as yet regarding the plane except that it will have a cruising speed of 120 m.p.h. and will be priced from $5,000 to $6,000. The company is well financed and production will be started about June, 1929.

Officers of the company are: Paul Marchetti, president; Dr. R. P. Giovannetti, vice president and secretary; Peter Lippi, treasurer. Besides the officers the board of directors includes: G. Gianni, Capt. A. I. Eagle, Paul Belli and Frank Santini.

Menasco Firm Adds New Unit to Factory

LOS ANGELES CALIF.—Demand for the Menasco-Salmson engine, being produced by Menasco Motors Co., Los Angeles, has increased so rapidly that the company has added a new unit of approximately 3,000 sq. ft. capacity to the original factory building. This additional space practically doubles the former production facilities and will enable the company to increase deliveries which are now several months behind.

The Menasco Motors Co. hopes to exhauts its supply of foreign parts during early 1929 and proceed at once to the production of a new radial air cooled engine which has been under development for some time by A. S. Menasco, president of the company.

Dupont Show Attracts Many

ATLANTIC CITY N. J.—A feature which attracted attention at the recent Du Pont Products Exhibit at Atlantic City is the showing of gasoline and oil containers similar to the equipment for the Byrd Antarctic Expedition.

The equipment shown includes a Tydol Aviation gasoline tank, Tydol gasoline can, and a Veedol motor oil can. These were supplied to the Du Pont Exhibit for display purposes by the Tide Water Oil Co. of New York City.

MANUFACTURERS' SPECIFICATIONS ON AMERICAN COMMERCIA

THE TABLE BELOW IS BELIEVED TO BE ACCURATE BUT *AVIATION* D

This table will appear monthly and correct

MANUFACTURER	Designation	Price of Plane at Factory	Type	No. of Seats	Make of Engine	Total Rated HP.	Make of Propeller	Span	Wing Area (Sq. Ft.)	Length Overall	Height Overall	Weight Empty (Lb.) With Water if Water Cooled Engine is Used	Pay Load (Lb.)	Disposable Load (Lb.)	Normal Gross Weight Loaded (Lb.)	F L	High Speed in M.P.H.
Advance Aircraft Co.	Waco 10	$5,535	OBL	3	RS9	125	H,Hs,SS	30'7"	286	23'9"	9'	1330	370	800	2025	107	
Advance Aircraft Co.	Waco 10	$2,035*	OBL	3	OX5	90	Hs	30'7"	286	23'6"	9'	1225	360	800	2025	96	
Advance Aircraft Co.	Waco 10	$2,585*	OBL	3	E	150	H,Hs,SS	30'7"	286	23'6"	9'3"	1508	600	1092	2600	115	
Advance Aircraft Co.	Waco 10	$7,341	OBL	3	J5	200	H,Hs,SS	30'7	286	22'6"	9'3"	1550	600	1050	2600	135	
Aero-Craft Mfg. Co.	Aero-Coupe	$5,800	SBL	3	W	110	F	32'	250	24'	8"6'	1100	550	100	2100	110	
Alexander Aircraft Corp.	Eaglerock	$2,250*	OBL	3	OX5	90	.....	36'8"	330	24'11"	9'11"	....	....	....	2442	100	
Alexander Aircraft Corp.	Eaglerock	$2,250*	OBL	3	RS9	125	.....	36'8"	330	24'11"	9'11"	....	....	....	2230	113	
American Eagle Aircraft Co.	.....	$2,985	OBL	3	OX5	90	H, Hs	30'	300	24'6"	8'4"	1227	840	830	2057	101	
Arkansas Aircraft Corp.	Comm'd-Aire	$2,450*	OBL	3	OX5	90	H	31'6"	300	24'6"	8'	1275	375	800	2075	104	
Arkansas Aircraft Corp.	Heinkel H.D. 40	$25,000	CBL	2	PWw	400	M	57'	250	39'	14'	3100	2500	4400	....	140	
Atlantic Aircraft Corp.	F-7 & C-2	$14,500	CML	10-12	3-J5	600	H	63'3"	630	49'2"	12'9"	5480	2000	3720	9060	122	
Atlantic Aircraft Corp.	Universal	$14,200	CML	5-7	J-5	200	H, Hs	47'9"	341	33'	8'9"	2100	1200	1900	4000	118	
Atlantic Aircraft Corp.	Super-Univ	$19,340	CML	6-8	P Ww	400	SS	50'6"	382	36"	8'11"	2800	1230	2200	5000	140	
Atlantic Aircraft Corp.	Fokker F-10	$60,000	CML	14	3-PWw	1200	SS	71'2"	728	50'8"	12'5"	7200	2640	4950	11500	148	
Arrow Aircraft Corp.	Arrow-Sport	$2,257	OBL	2	LB	60	.....	25'6"	178	19'2"	6'11"	524	....	450	974	105	
Bach Aircraft Co.	Air Yacht	$31,800	CML	10-12	2-RSg-pww	650	2 Sty,SS	52'	412	36.1	9'6"	3300	....	3200	6500	150	
Bellanca Aircraft Corp.	CH	$14,500	CML	6	J5	200	Hs	46'4"	273	24 9	8 6	1850	2229	3284	5134	128	
Berliner Aircraft Co.	.....	.....	OML	3	J5	200	SS	34'	206	25'	8'	1400	....	....	2033	136	
Bird Wing Commr. Airplane Co.	No. 6	$2,795	OBL	3	OX5	90	Hs	31'4"	303	23'6"	8'7	1236	550	1019	2255	90	
Boeing Airplane Co.	40-A	$22,500	SBL	3	P Ww	400	H M	44'2"	545	33'4"	11'8"	3313	1579	2687	6000	129	
Boeing Airplane Co	40-B	$24,500	SBL	3	P Wh	400	H M	44'2"	545	33'4"	11'8"	3543	1428	2536	6079	132	
Boeing Airplane Co.	40-C	$22,500	SBL	5	P Ww	500	H M	44'2"	545	33'4"	11'8"	3522	1445	2553	6075	129	
Boeing Airplane Co.	B-1E	$18,500	CBF	6	P Ww	400	H W	39'8"	545	32'6"	12'	3090	750	1460	4550	115	
Boeing Airplane Co.	B-1D	$15,000	CBF	4	J5	200	.. ..	39'8"	466	30'9"	12'	2412	720	1000	3442	95	
Bourdon Aircraft Corp.	Kitty-Hawk	$4,800	OBL	3	RS7	96	W	28'	234	21'11"	8'6"	1102	....	750	1900	110	
Breese Aircraft Co.	.....	.....	CML	6	J5	200	SS	41'	260	27	10'6"	155	..	1000	2550	120	
Brown-Mercury Aircraft Corp.	C-3	$9,800	CML	3	3-A6	180	Sty	41'6"	260	25'	.....	1450	600	1500	2950	120	
Buhl Aircraft Co.	Airsedan-C5A	$13,500	CBL	5	J5	200	SS	42'	334	28	10'	2072	000	1628	3700	120	
Buhl Aircraft Co.	Airsedan CA-3C	$12,000	CQL	3-4	J5	200	M	36'	240	28'	8'6"	1800	655	1400	3200	139	
Buhl Aircraft Co.	Junior Airsedan	$8,000	CQL	3	W	110	M	36'	240	25'	8'6"	1500	520	1000	2500	110	
Cessna Aircraft Co.	3-120	$5,750	CML	3	A	120	H Hs	40'6"	224	23'8	7 4	1250	480	750	2000	125	
Cessna Aircraft Co.	4-125	4,075*	CML	4	RS9	125	H Hs	40'6"	224	23'8	7 4	1260	760	1030	2280	120	
Cessna Aircraft Co.	4-200	$9,800	CML	4	J5	200	H Hs	40'6"	224	23'8	7 4'	350	800	1070	2420	150	
Crawford M. & A. Mfg. Co.	A1	$1,500	OML	2	LR	80	own	30'	150	17'9"	7'	950	....	450	1400	95	
Crown Motor Carriage Co.	B3	.....	OBL	2-3	K-5	100	S	28'6"	236	21'3"	8'5"	850	330	700	1500	110	
Curtiss-Robertson A'p'he Mfg. Co.	Robin	$4,000	CML	3	OX5	90	Hs	41'	245	25'9"	7 10"	1489	328	728	2217	101	
Driggs Aircraft Corp.	Dart II	$1,900	OBL	2	A3	35	Hs	28'	140	19'6"	6'	450	..	370	820	85	
G. Elias & Bro. Inc.	M-1	$7,500	OBL	1	L12	400	CR	40'	497	28'	12	2857	1200	2016	4867	126	
G. Elias & Bro. Inc.	Airmobile	$7,500	OBL	3	L12	400	CR	40'	435	28'	11'3"	2759	420	1290	4049	146	
G. Elias & Bro. Inc.	Aircoupe	$3,350	CML	2	A	80	Elias	28 1½"	192	21'	7'2"	870	518	564	1334	96	
Fairchild Airplane Mfg. Co.	FC-2W2 land	.....	CML	5	P Ww	400	SS	50'	332	32'10"	9'4"	2781	....	2719	5500	140	
Fairchild Airplane Mfg. Co.	FC-2W2 sea	.....	CMW	5	P Ww	400	SS	50'	332	37'2"	11'7"	3129	....	2371	5500	125	
Fairchild Airplane Mfg. Co.	FC-2 land	.....	CML	5	J5	200	CR	44'	290	30'11"	9'	2150	845	1456	3650	122	
Fairchild Airplane Mfg. Co.	FC-2 sea	.....	CMW	5	J5	200	CR	44'	290	32'5"	11'5"	2427	833	1573	4000	112	
Federal Aircraft Corp.	CM-1	$12,500	CM	5	J4B	200	We	37'6"	262	29'3"	9'	2080	630	1395	3475	125	
Gates-Day Aircraft Corp.	GD-24	$3,500*	OBL	5	E	180	.....	45'	350	26'	11'	1600	780	1305	2905	115	
Gulls Aircraft Corp.	Crusader	.....	CBL	4	RS9	125	Hm	32 9	245	23'	8'1"	....	....	....	2400	110	
Hamilton Metalplane Co.	H-19	.....	CML	6	J5	200	H	48'	287	32'7"	8'10"	1960	....	2000	3960	120	
Hamilton Metalplane Co.	H-21	.....	CML	8	PWw	400	H	54'	392	33'7"	9'	2685	....	2205	4700	135	
Heath Airplane Co.	Parasol	$695	OML		H	23	own	23'	94	16'9"	5'11"	290	....	225	515	70	
International Aircraft Corp.	F-17	$2,750*	OBL	3	OX5	90	H	35'	325	25	9'6"	1300	400	821	2121	100	
International Aircraft Corp.	F-17	$2,900*	OBL	4	J5	200	SS	35'	325	25	.....	1350	400	1239	2589	140	
International Aircraft Corp.	F-18	$2,250*	OBL	7	J5	200	SS	37'	360	27'6"	10'6"	1550	1000	1843	3393	130	
Ireland Aircraft, Inc.	Neptune	$14,600	CMA	5	J5	200	CR	40	350	31'6"	11'6"	2250	750	1358	3608	95	
Irwin Aircraft Co.	M-T-2	$1,165	OBL	1	179	25	own	20'	105	13'6"	5'9"	275	100	300	575	90	
Karl-Keen Aircraft Inc.	Coupe	.....	CML	2	V	45	.....	30'	150	22'	6'6"	650	480	....	1130	110	
Keystone Aircraft Corp.	Pronto	.....	OBL	3	J5	200	.....	39'11"	365	28'9"	.....	1975	....	1310	3285	112	
Keystone Aircraft Corp.	Pathfinder	.....	CBL	12	3-J5	600	.....	66'6"	1150	46'	.....	6536	1900	4481	10841	112	
Kinner A. & M. Co.	Courier	.....	OML	2	K-	100	SS	35'	216	23'	7'	915	....	550	1465	120	
Kreider-Reisner Aircraft, Inc.	Chal'enger	$2,400*	OBL	3	OX5	90	Hs, H	30'1"	285	23'9"	9'4"	1200	412	811	2000	103	
E. M. Laird Airplane Co.	Commercial	.....	OBL	3	J5	200	SS	34'	300	23'6"	9'3"	1550	800	....	....	130	
Laird Aircraft Corp.	Whippoorwill	.....	CBL	4	J-5	200	.....	36'	351	27	9	1650	....	1000	2650	125	
Lincoln Aircraft Co.	Lincln-Page	.....	OBL	3	OX5	90	.....	32'	300	.....	.....	1200	450	1000	2200	100	
Lockheed Aircraft Co.	Vega	.....	CML	5-7	J5	200	SS We	41'	275	27'5"	8'6"	1650	1000	1550	3200	135	
Lockheed Aircraft Co.	Air Exp.	.....	CML	5-7	P Ww	400	SS	41'	275	27'5"	8'6"	1850	1000	1845	3645	167	
Loening Aeronautical Engr. Corp.	Cabin Amphibian	$26,700	CBA	5-7	PWw	400	SS	45'	504	34'8"	13'2"	3400	1200	2000	5400	120	
B. F. Mahoney Aircraft Corp.	Ryan B1	$12,200	CML	5	J5	200	H W	42'	290	27'5"	9'10"	1870	800	1430	3300	126	
Metal Aircraft Co.	Flamingo G-1	.....	CML	6-8	PWw	400	SS	48'	354'	30'	9'	2800	....	2050	4850	140	
Mono Aircraft Inc.	Monocoupe	$2,675	OML	2	V	70	Hs	30'6"	124	22'	6'3"	725	....	500	1225	90	
Mohawk Aircraft Corp.	Pinto	$2,375	CML	2	A	60	.....	30'	150	20	6'3	700	....	475	1175	102	
National Airways System, Inc.	Air King	$2,395	OBL	3	OX5	90	Hs	34'1"	310	25'5	9'	1290	....	800	2090	103	
Niles Aircraft Co.	Williams	.....	OML	1	Ss	40	.....	26'	108	18	6'6"	440	....	....	....	85	
Pheasant Aircraft Co., Inc.	H-10	$2,375	OBL	3	OX5	90	Hs	32'6"	283	23'6"	9'	1297	600	785	2082	100	
Pitcairn Aviation, Inc.	Mailwing	$10,000	OBL	1-3	J5	200	SS	33'	252	22'10"	8'10"	1612	600	770	2512	136	
Pitcairn Aviation Inc.	Super Mai wing	.....	OBL	1-2	J5	200	.....	33'	262	22'10½"	9'3"	1840	....	1160	3000	128	
Pitcairn Aviation, Inc.	PA-4	.....	OBL	3	OX5	90	Hs	30'	226	21'10"	8'7"	1165	....	785	1950	101	
Prudden-San Diego Airplane Co.	T-M-1	.....	CML	7	3-RS9	375	Wd	57'	427	38'	9'5"	3000	1290	2152	5152	110	
RichmondAirways, Inc.	Sea Hawk	.....	OMF	5	C6	160	.....	46'	317	28'	.....	1700	....	1000	2700	95	
Sikorsky Mfg. Co.	S-36	.....	OBa	8	2-J5	400	.....	72'	668	34"	12'	4600	....	3000	7600	115	
Sikorsky Mfg. Co.	S-37	.....	CBL	18	2P Wh	1000	.....	100'	1049	45'6"	16'3"	8000	4060	7000	15000	122	
Sikorsky Mfg. Co.	S-38	.....	OBA	11	2P Ww	800	SS, H	71'8"	720	40'3"	13'10"	5900	1630	3300	9200	129	
Simplex Aircraft Corp.	Red Arrow	$3,950	CML	2	K5	100	Sty	33'4"	148	20' 1'	6'10"	1000	....	600	1600	125	
Starling Aircraft Co.	.....	.....	OB	3	OX5	90	.....	32'	....	23'4"	9 '	1237	....	600	1837	104	
Stearman Aircraft Co.	C-2-K	$6,740	OBL	3	RS9	125	H, Hs	35'-28'	296	24'	9'	1285	350	865	2150	110	
Stearman Aircraft Co.	C-2-B	$8,730	OBL	3	J5	200	H, CR	35'-28'	296	23	9'	1438	400	962	2400	130	
Stinson Aircraft Corp.	SB-1	$11,000	CBL	5	J5	200	SS	35'10"	354	28'10"	10'3"	1815	....	1465	3280	118	
Stinson Aircraft Corp.	Sm-1B	$12,500	CML	6	J5	200	SS	45'10"	292	32'	9'	1970	....	1515	3485	128	
Stinson Aircraft Corp.	Junior	$6,750	CML	4	W	110	Wd	39'6"	236	26'3"	7'10"	1450	525	1000	2450	105	
Spartan Aircraft Co.	C-3	.....	OBL	3	RS9	125	.....	32'		23'6"	8'9"	1140	....	800	1940	115	
Stout Metal Airplane Co.	4 AT	.....	CML	12	3J5	600	SS	74'	785	49'10"	12'8"	6200	2200	3800	10000	114	
Swallow Airplane Mfg. Co.	Commercial	.....	OBL	3	OX5	90	.....	32'	300	24'	8'6"	1470	360	730	2200	100	
Taylor Bros. Aircraft Co.	Chummy	$3,800	SML	2	K-5	100	.....	34'	175	22'	7'6"	950	160	550	1500	110	
Texas Aero Corp.	Temple	.....	OML		J5	200	.....	39'4"	225	25'10"	8'3"	....	567	....	2250	..	
Thaden Metal Aircraft Co.	T-1	.....	CML	7	P Ww	400	.....	53	....	35	11	2900	..	2200	....	..	
Thunderbird Aircraft, Inc.	W-14-O	$2,950*	OBL	3	OX5	90	Sty	31'	278	24'8"	9'7"	1433	340	815	2248	114	
Thunderbird Aircraft, Inc.	W-14-H	.....	OBL	3	E	150	Sty	31'	278	24'8	9'7"	1551	500	945	2496	135	
Travel Air Mfg. Co.	2000	$2,950	OBL	3	OX5	90	H, Hs	34'8"	296	24'2"	8'9"	1350	350	750	2100	100	
Travel Air Mfg. Co.	4000	$9,100	OBL	3	J5	90	H	34'8"	296	23'6"	8'9"	1400	600	1000	2400	130	
Travel Air Mfg. Co.	6000	$13,000	CML	5	J5	200	SS, H	48'7"	282	30'10½"	18'8½"	2375	944	1625	4000	128	
Travel Air Mfg. Co.	Caminez	.....	OBL	3	FC	135	HH,s	34'8"	296	24'2"	8'9"	1275	400	875	2150	110	
Travel Air Mfg. Co.	9000	.....	OBL	3	RS9	125	W	34'8"	296	24'2"	8'9"	1250	360	960	2210	105	
Wallace Aircraft Co.	Touroplane	$2,500*	CML	3	A	80	Hs	37'	205	23'6"	7'6"	850	320	650	1500	95	
Whites Aircraft.	Hum. Bird	$2,150	OBL	3	OX5	90	Hs	33'1"	318	23'6"	8'3"	1050	450	850	1900	97	
Western Airplane Corp.	King Bird	$2,500	OBL	3	OX5	90	Hs	35'	320	25'4"	9'	1200	600	800	2000	95	
Zenith Aircraft Corp.	Albatross	$35,000	CML	14	3-RS9	375	Sty.	90'	1032	50'	12'6"	4000	5000	7000	2,000	100	

TYPE:
A—Amphibian
B—Biplane
C—Closed
F—Flying boat
L—Landplane
M—Monoplane
O—Open
Q—Sesquiplane
S—Semi-closed
W—Seaplane

ENGINE: One engine unless stated in italics.
A—Anzani
C6—Curtiss
E-Wright Hispano-E
FC—Fairchild Caminez
H—Henderson
I79—Irwin
J5—Wright Whirlwind
K—Kinner
L—Liberty
LB—Le Blond
LR—LaRhone
OX5—Curtiss
P Wh—Pratt & Whitney Hornet
P Ww—Pratt & Whitney Wasp
RS—Ryan Siemens
SR—Super Rhone
Ss—Szekely
V—Velie
W—Warner
*—Price without engine

PROPELLER:
CR—Curtiss Reed
H.—Hamilton
Hs—Hartzell
M—Metal
Sty—Story
SS—Standard Steel
W—Wood
We—Westinghouse

FUSE
B—Bol
Cor.—C
D—Du
F—Fab
Mon—
O—Ope

BRA
B—Ben
Ex—Ex
H—Hy

ERCIAL AIRPLANES AND SEAPLANES AS COMPILED BY *AVIATION*

TION **DOES NOT ASSUME RESPONSIBILITY FOR THE FIGURES GIVEN**

and corrections and suggestions are invited.

Performance With Full Load at Sea Level As Supplied by Manufacturers.																			
High Speed in M.P.H.	Cruising Speed in M.P.H.	Landing Speed in M. P. H.	Climb at Sea Level in F. P.M	Climb to 10'000 in Minutes	Service Ceiling in Feet	Fuel Capacity in Gallons	Normal Range in Miles	Normal Fuel Consumption at Cruising Speed' Gal. Per Hr.	Fuselage Construction	Wing Construction	Are Wings Wired for Lighting?	Type of Control	Brakes	Type of Shock Absorber	Type of Pontoon Provided for	Additional Cost as Seaplane	Dept. of Commerce Type Certificate Number	Performance Figure Guaranteed?	
107	93	35	..	..	....	37	..	....	Wl-ST	Wd-F	Yes	SPD	Ex.	O-S	EFH	$1,100	26	....	Advance—Waco Siemens
96	85	35	..	..	13,000	48	450	8	Wl-ST	Wd-F	Yes	SPD	Ex	O-S	EFH	....	13	....	Advance—Waco OX—5
115	105	40	..	..	15,000	76	..	....	Wl-ST	Wd-F	Yes	SPD	Ex.	O-S	EFH	$1,100	42	....	Advance—Waco Hisso
135	118	40	1200	..	18,000	65	..	12	Wl-ST	Wd-F	Yes	SPD	Ex.	O-S	EFH	$1,100	41	....	Advance—Waco W—J—5
110	100	38	900	..	12,000	44	400	6.6	Wl-ST	Wd-F	Yes	SD	B	Arl	....	$1,000	Apl.	Yes	Aero-Craft—Coupe
100	87	34	514	..	11,500	46	435	10.3	Wl-ST	Wd-F	....	SCD	....	RC	E	....	7	Yes	Alexander—Eaglerock
113	85	38	460	..	14,780	46	425	10	Wl-ST	Wd-F	$20	SCD	....	RC	E	....	..	....	Alexander—Eaglerock
101	85	30	575	45	12,000	42	425	7.5	Wl-ST	Wd-F	Yes	SPD	Ex.	RAR	E	$990	17	Yes	American Eagle
104	85	36	550	.	10,000	..	400	....	Wl-ST	Wd-F	Yes	S	No	RC	E	$1,100	53	....	Arkansas—Com'd'aire
140	..	54	..	..	18,000	..	600	....	Wl-ST	Wd-F	Yes	DeD	Yes	Arl	M	$2,000	..	5% N	Arkansas—Heinkel H.D. 40
122	100	55	720	24	12,500	185	580	32	Wl-ST	Wd-P	Yes	DeCD	Yes	RAR	....	....	Apl	....	Atlantic—Fokker F7 & C-2
118	98	48	500	40	11,500	78	600	12	Wl-ST	Wd-P	Yes	SCD	Yes	RC	M	$2450	9	....	Atlantic—Fokker Univ.
140	118	42	1000	15	18,000	120	700	20	Wl-ST	Wd-P	Yes	SCD	Yes	RAR	M	$3110	Apl	5%	Atlantic—Super Univ.
148	125	55	1400	10	18,000	286	580	60	Wl-ST	Wd-P	Yes	DeCD	Yes	RC	....	....	..	....	Atlantic—Fokker F-10
105	..	36	680	..	15,200	..	..	..	Wl-ST	Wd-F	....	SD	....	RC	....	....	..	....	Arrow—Sport
150	110	45	1100	12	18,000	170	500	32	Wd-P	Wd-F	Yes	DeCD	S-B	Hy-C	....	....	..	Yes	Bach—Air Yacht
128	110	46	850	..	13,000	92	800	10	Wl-ST	Wd-F	Yes	SCD	Yes	RC	D	....	47	....	Bellanca—CH
136	110	44	..	..	....	44	450	10	Wl-ST	Wd-F	....	D	Yes	....	..	....	39	....	Berliner
90	80	30	460	80	10,000	35	325	9	Wl-ST	Wd-F	Yes	bC PD	Ex.	RC	E	$190	Apl	Yes	Bird Wing—No. 6
129	..	57	600	25.3	12,000	140	..	20	Wl-ST	Wd-F	Yes	S	S	O	....	....	2	....	Boeing—40A
132	..	57	800	16.5	15,100	140	..	25	Wl-ST	Wd-F	Yes	S	S	O	....	....	27	....	Boeing—40-B
129	..	57	600	25.3	12,000	140	..	20	Wl-ST	Wd-F	Yes	S	S	O	....	....	54	....	Boeing—40-C
115	..	59	1000	18.5	12,000	80	..	20	Wd	Wd-F	Yes	De	....	....	....	....	..	....	Boeing—B-1E
95	..	52	..	..	12,000	40	..	....	Wd	Wd-F	Yes	DeD	....	....	..	..	23	....	Boeing—B-1D
110	90	38	..	..	12,000	38	..	6.5	Wl-ST	Wd-F	...	SPD	....	RD	....	....	Apl	....	Bourdon Kitty Hawk
120	115	43	900	..	15,500	80	550	9.5	Wl-ST	Wd-F	....	..	....	RC	....	....	..	....	Breese
120	100	40	600	35	14,000	78	650	12	Wl-ST	Wd-F	Yes	SC	....	Grs.	No	....	Apl	....	Brown-Mercury—C-3
120	95	50	0	45	13,500	70	..	15	Wl-ST	Wd-F	Yes	SC	Yes	OS	Met	+2,500	33	....	Buhl Airsedan
139	115	45	900	15	14,000	90	700	14	Wl-ST	Wd-F	Yes	SP	Yes	OS	Met	$3,000	46	5%	Buhl Special Airsedan
110	90	40	600	25	11,000	..	600	7	Wl-ST	Wd-F	Yes	SP	Yes	OS	Met	$2,000	Apl	5%	Buhl Junior Airsedan
125	11.	45-50	100.	..	....	42	400	10	Wl-ST	Wd-PF	Yes	SPD	Ex.	RAR	....	....	Apl	5%	Cessna Aircraft Co.
12o	11.	45	100	..	....	42	40.	10	Wl-ST	Wd-PF	Yes	SPD	Ex.	RAR	....	....	Apl	5%	Cessna Aircraft Co.
150	125	45-50	1400	..	....	42	40.	12	Wl-ST	Wd-PF	Yes	SPD	Ex.	RAR	....	....	Apl	5%	Cessna Aircraft Co.
95	64	47	..	..	18,000	40	500	6	ST-Wd	Wd-F	No	D	....	RC	....	....	No	5%	Crawford—A1
110	90	35	750	45	14,000	27	400	6	Wd	Wd-F	No	SD	No	Grs	....	....	Apl	Yes	Crown—B3
101	85	46	400	.	11,500	50	607	7	Wl-ST	Wd-FD	Yes	S-PC	No	RAR	....	....	40	5%	Curtiss—Robin
85	75	46	560	..	15,000	15	375	3	Wl-ST	Wd-FD	Yes	....	No	RC	None	....	15	5%	Driggs—Dart II
126	105	45	1250	19	15,000	100	525	20	Wl-ST D	Wd-F	Yes	C	No	TR	....	....	No	....	G. Elias & Bros.—M
146	125	45	1050	10	16,000	100	625	20	Wl-ST	Wd-F	Yes	SC	No	RC	....	....	..	....	Elias—Airmobile
96	80	25	590	..	10,000	20	400	4	Wl-ST	Wd-F	Yes	SC	No	Elias	None	....	..	....	Elias—Aircoupe
140	110	55	1050	13	17,500	160	900	20	Wl-ST	Wd-F	Yes	S-CP	Yes	Hy	F	....	61	....	Fairchild—FC-2W2 land
125	95	58	900	15	17,000	160	850	20	Wl-ST	Wd-F	Yes	S-CP	....	....	F	....	20	....	Fairchild—FC-2W2 sea
122	103	53	580	27	13,100	110	710	15.5	Wl-ST	Wd-F	Yes	S-CP	Yes	Hy	F	....	10	....	Fairchild—FC-2 land
112	..	53	1250	36	12,700	110	650	15.5	Wl-ST	Wd-F	Yes	S-CP	....	....	F	....	10	....	Fairchild—FC-2 sea
125	105	40	..	..	....	84	750	10	Wl-ST	Wd	Yes	SC	Yes	Arl	..	....	..	....	Federal Aircraft—CM-1
115	95	35	800	..	16,000	56	..	....	DR-F	Wd-F	Yes	SC	No	RD	None	....	..	....	Gates—Day—New Standard
110	90	45	600	..	11,500	45	420	....	Wl-ST	Wd-F	Yes	DeD	B	O	....	....	..	....	Gillis—Crusader
120	100	50	750	..	14,000	80	650	12	D-cor.	D-cor.	Yes	SPD	Yes	O	H	$2500	..	5%	Hamilton—H-19
135	115	55	125	..	18,000	150	750	21	D-cor.	D-cor.	Yes	SPD	Yes	O	H	$3000	..	5%	Hamilton—H-21
70	65	32	200	..	....	3.3	120	....	R-ST	Wd-F	No	SC	No	RC	....	....	..	....	Heath—Parasol
100	87	35	600	..	10,500	40	450	....	Wd	....	....	S	Ex.	O	....	....	35	5%	International—F-17
140	120	35	1000	..	16,000	66	700	....	Wd	Wd-F	....	S	Ex.	O	....	....	Apl	5%	International—F-17
130	110	40	800	..	15,000	106	1000	....	Wd	Wd-F	....	S	Ex.	O	....	....	Apl	5%	International—F-18
95	85	46	650	35	11,000	65	500	12	ST-D	Wd-F	Yes	DeD	No	OC	....	....	Apl	5%	Ireland—Neptune
90	75	28	400	65	12,000	8	300	1.7	Wd	Wd-F	Yes	SC	....	RC	W	$175	..	6%	Irwin—M-T-2
110	90	38	680	..	13,000	28	..	....	Wl-ST	Wd-F	....	SPeP	....	RC	....	....	..	....	Kari—Keen—Coupe
112	..	..	800	..	14,000	60	..	....	Wl-ST	Wd-F	....	....	....	....	....	....	..	....	Keystone—Pronto
112	..	57	570	..	....	..	500	....	Wl-ST	Wd-F	....	....	....	....	....	....	..	....	Keystone—Pathfinder
120	110	35	900	..	20,000	..	800	7	Wl-ST	Wd-F	....	....	S	Gr	....	....	..	....	Kinner—Courier
102	..	39	548	..	12,000	..	400	....	Wl-ST	Wd-F	Ex.	SD	No	RC	EH	$1,100	19	5% N	Kreider-Reisner—Challenger
130	10	40	1350	10	....	80	600	....	DT, S	Wd-F	....	SPA	....	....	....	....	..	....	E. M. Laird—Commercial
125	105	40	..	15	....	..	..	....	Wl-ST	Wd-F	Yes	DeD.	Std	RC	....	....	..	....	Laird—Whippoorwill
100	..	35	600	..	....	42	500	....	Wl-ST	Wd-F	....	....	....	....	....	....	28	....	Lincoln—Page
135	110	50	1000	16	15,900	100	700	10	W-mon.	Wd-P	Yes	SC	H	RHy	E	....	Apl	5%	Lockheed—Vega
167	135	53	1460	10	17,250	100	1000	18	W-mon.	Wd-P	Yes	SC	H	RHy	....	....	Apl	5%	Lockheed—Air Express
120	..	50	..	..	14,000	140	650	....	Wd-D	Wd-F	Yes	DeC	Ex.	RC	....	....	34	....	Loening—Amphibian
126	108	49	1000	..	16,000	83	700	10-11	Wl-ST	Wd-F	....	SC	B	Grs	E	$1,800	25	Yes	B. F. Mahoney—Ryan B1
140	120	48	1250	..	....	150	1000	18	Wl-ST,D	D	Yes	DeDC	S	Arl	....	....	..	....	Metal—Flamingo
90	75	35	800	..	12,000	..	360	20	Wl-ST	Wd-F	Yes	S	Std	Arl	....	....	..	....	Mohawk—Pinto
102	87	35	700	35	....	25	4 0	4	Wl-ST	Wd-F	Yes	SP	....	RC	....	....	22	Yes	Mono Aircraft—Monocoupe
103	85	35	600	..	15,000	35	396	8	Wl-ST	Wd-F	No	S	No	RC	....	....	29	....	National Airways—Air King
85	..	30	925	..	....	..	360	....	Wl-ST	Wd-F	....	SC	Std	....	....	....	Apl	....	Niles—Williams
100	90	35	500	25	12,500	38	400	9	Wl-ST	Wd-F	Ex.	SPD	Ex.	RC	EH	$1,000	36	....	Pheasant—H10
136	105	45	1600		11,000	60	600	....	Wl-ST	Wd-F	Yes	S	Yes	Arl	....	$900	18	5%	Pitcairn—PA-5
128	110	45	..	..	....	76	..	....	Wl-ST	Wd-F	Yes	S	....	Arl	....	....	..	....	Pitcairn—PA-6
101	82	45	..	..	....	35	400	....	Wl-ST	Wd-F	....	S	....	Grs	..	....	..	....	Pitcairn—PA-4
110	95	52	500	25	11,000	11	400	21	D-cor.	D-cor.	....	....	B	Grs.	..	....	..	....	Prudden-San Diego—T-M-1
95	..	45	..	..	....	42	..	....	Wd-D	Wd-F	....	DeCP	....	....	....	....	..	....	Richmond Airways—Sea Hawk
115	100	51	400	..	11,000	326	1000	25	Wd-D	DOR, B	....	De D	....	RDO	....	....	..	5%	Sikorsky—S36
122	112	58	650	..	15,000	370	790	50	DOR, B	DOR, B	....	De D	Hy	RDO	....	....	Apl	5%	Sikorsky—S37
129	110	50	1000	18	20,000	2.0	600	36	Wd-D	DOR, B	Yes	DeD	....	DOS	WD	....	60	....	Sikorsky—S38
125	110	40	1000	17	16,000	..	1250	5.5	Wl-ST	Wd-F	Yes	S	....	....	....	....	..	5%	Simplex—Red Arrow
104	95	30	..	15,000	....	40	400	....	Wl-ST	Wd-F	....	SD	....	HyC	....	....	..	....	Starling
110	90	38	625	..	12,000	50	500	7	Wl-ST	Wd-F	Yes	PC	St.	RHy	D	....	Apl	5%	Stearman—C-2-K
130	110	41	1000	..	18,000	65	620	11.5	Wl-ST	Wd-F	Yes	PC	St.	RHy	D	$1,200	Apl	5%	Stearman—C-2-B
118	100	46	600	..	13,500	70	600	11.5	Wl-ST	Wd-F	Yes	DeD	St.	....	M	$2,500	24	5%	Stinson—SB-1
128	105	55	750	..	14,000	90	700	11 5	Wl-ST	Wd-F	Yes	DeD	St.	Hy	M	$2,500	16	5%	Stinson—SM-1
105	90	45	..	..	....	45	550	....	Wl-ST	Wd-F	Yes	DS	Yes	Hy	....	....	..	....	Stinson—Junior
115	..	37	800	..	....	44	600	....	Wl-ST	Wd-F	....	S	....	RC	....	....	..	....	Spartan—C-3
114	100	55	.	..	14,000	235	540	30	D-cor.	D-cor.	Yes	DeD	St	O	....	....	..	....	Stout—Ford—4A7
100	..	35	600	..	....	36	500	....	Wl-ST	Wd-F	....	....	....	RC	....	....	21	....	Swallow—Commercial
110	100	38	850	..	....	30	500	6	Wl-ST	Wd-F	Yes	SP	....	RC	....	....	..	Yes	Taylor Bros.—Chummy
..	..	..	..	..	....	50	..	....	Wl-ST	Wd-F	....	S	....	....	....	....	..	....	Texas—Temple
..	..	..	..	..	....	120	..	....	D-cor.	D-cor	....	De	....	Grs.	....	....	..	....	Thaden Metal—T-1
114	95	40	800	20	15,000	43	440	10	Wl-ST	Wd-F	Yes	SpeD	Ex	R	EH Ex	$1,100	Apl	5%	Thunderbird W14-O
135	110	42	1000	16	16,000	60	440	15	Wl-ST	Wd-F	Yes	SpeD	Ex	R	EH Ex	$2,950	Apl	5%	Thunderbird W-14-H
100	..	40	..	..	....	42	410	8	Wl-ST	Wd-F	Yes	SPC	No	RC	....	....	30	....	Travel Air—2000
130	..	45	..	..	....	60	..	12	Wl-ST	Wd-F	Yes	SPC	No	RC	....	....	32	....	Travel—4000
128	107	50	700	..	12,000	78	650	12	Wl-ST	Wd-F	Yes	DeD	Yes	O	....	....	..	....	Travel Air—6000
110	..	37	..	..	....	42	475	..	Wl-ST	Wd-F	Yes	SPC	....	RC	....	....	37	....	Travel Air—Caminez
105	..	42	..	..	....	66	650	..	Wl-ST	Wd-F	Yes	SPC	....	RC	....	....	38	....	Travel Air—Siemens
95	82	40	670	37	11,000	28	500	5 25	Wl-ST	Wd-F	Yes	SPD	....	Hy	....	....	..	....	Wallace—Touroplane
97	90	35	600	..	14,000	40	350	8	Wd Wl S	Wd-F	No	S	....	C	E	....	Apl	5%	Whites—Humming Bird
95	85	30	600	20	12,000	3	500	8	Wl-ST	Wd-F	No	SC D	No	RC	Own	$1,000	No	5%	Western—King Bird
100	85	35	600	..	20,000	3 00	1000	20	Wl-ST	Wd-F	Yes	C	Yes	Arl	No	....	..	Yes	Zenith—Albatross

FUSELAGE AND WING CONSTRUCTION:
B—Bolted
Cor.—Corrugated
D—Duralumin
F—Fabric cover
Mon—Monocoque
O—Open section

BRAKES:
B—Bendix
Ex—Extra
H—Hydraulic
L—Lockheed
S—Sauzedde
Std—Standard

P—Plywood cover
R—Riveted
S—Steel
T—Tubing
Wd—Wood
Wl—Welded

LIGHTS:
N—Navigation lights

CONTROL:
A—Arens
C—Cables
D—Dual
De—Wheel
P—Push rods
S—Stick
Pl—Pedal

SHOCK ABSORBER:
Arl—Aerol
C—Cord
D—Compression
Grs—Gruss
Hy—Hydraulic
O—Oleo
R—Rubber
RAR—Ruseo Aero Rings
S—Coil Spring
T—Trombone

PONTOONS:
D—Duralumin
E—Edo
F—Fairchild
H—Hamilton
M—All metal
W—Wood

TYPE CERTIFICATE:
Apl—Applied for and is pending

GUARANTEE:
N—New

Pennsylvania Base Oil Used by Many Racers

MINES FIELD, LOS ANGELES.—Wide use of Pennsylvania base lubricating oils by the industry was illustrated during the 1928 National Air Races by the participation of Kendall Penzbest lubricants in the Class A, B, and C transcontinental derbies.

Twenty-two of the 39 starters in Class A were using Kendall Penzbest lubricants; 15 of the 22 planes that finished in this class were using this type of oil, and of these 15 the first 5 place winners were so lubricated.

In Class B, nine of the planes to finish were lubricated with Kendall Penzbest products, and Robert Cantwell, who flew his Whirlwind Lockheed Vega to first place in the Class C race, reported excellent lubrication by Penzbest.

The Kendall organization at Mines Field was equipped to service all pilots wishing to use the Penzbest lubricants in the closed course races and those who employed Penzbest for their engine lubricating during the cross-country races also used this lubricant in the various civilian contests on the closed course.

Wasp Engines Took Many Race Honors

In the recent New York-Los Angeles transcontinental air races several "places" were won by planes powered with Pratt & Whitney engines. In the non-stop flight, Art Goebel piloted a Lockheed plane powered by a Wasp engine. In this same plane he broke the record for the cross-country flight when about a month ago he flew from California to New York in the record-breaking time of 18 hr. and 58 min. The Wasp also placed first, second, and third in the Class C event.

Not only did the P. & W. engines place in the cross-country races but also in the Los Angeles races. A Boeing Fighter won the diving and climbing event, the plane being powered by a Wasp engine and piloted by Lieut. M. T. Seligman. The same plane also won the free-for-all pursuit race, averaging slightly less than 175 m. p. h. This time the plane was piloted by Lieut. T. P. Jeter.

Robert Cantwell in a Wasp powered Lockheed won the speed race. The Wasp also took second place.

A. C. of C. Dinner for Cinema

NEW YORK, N. Y.—Representing the aviation industry, the Aeronautical Chamber of Commerce of America was host to the motion picture industry at a dinner held at the Waldorf-Astoria, September 24. The part played by the cinema in developing areonautics was lauded by Maj. Lester D. Gardner, president of the Chamber.

A motion picture air history of Col. Charles A. Lindbergh was the feature of the gathering attended by nearly 600 persons, including leaders in both fields.

Colors Propeller Tips as Warning

MILWAUKEE, WIS.—Edgar La Parle, local pilot, has devised a plan to warn persons away from whirling propellers. A simple marking of red and blue stripes painted on the tips of the air screw clearly defines the rotating blades, and according to La Parle definitely apprises those standing in most of the angles of approach to the danger zone.

Consolidated Closes Four New Contracts

LOS ANGELES, CALIF.—Contracts providing for exclusive use of Consolidated Instruments on four planes were closed at the Exposition here, according to M. E. Hulse, Western Representative of the instrument firm. The companies involved are Courier Aircraft Co., Federal Aircraft Co., R. A. Bohn, and the Szekely Aircraft Co.

Mr. Hulse also announced closing of contracts with the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo. to act as distributor of Dictator Goggles in the territory east of Denver and with the American Aircraft Corp. to distribute this product in Los Angeles County, Calif.

Mott, N. D., Schedules A Tri-State Air Meet

MOTT, N. D.—A Tri-State (Montana North and South Dakota) Air Meet and Aviation Show will be held at the Legion Airport at Mott, October 2-4. Mott is located near the southwestern corner of North Dakota and is not far from the Montana and South Dakota borders. The field is only about a half mile from town with runways of 2,000 ft. in all directions.

The events include spot landing contests, cross country races for various type planes, takeoff competitions, and stunting exhibitions. In addition, special prizes will be awarded to the pilot coming the farthest air line distance, to the pilot arriving first at the field, to the flier carrying the most passengers, and to pilots competing in all the events.

Newark Meet Postponed

NEWARK, N. J.—According to an announcement made recently by Mayor Thomas L. Raymond, the celebration and air races planned for the opening of the new metropolitan airport here will be postponed until next Spring. Mayor Raymond stated however that this postponement would not interfere with the transfer of the New York Air Mail terminal from Hadley Field to Newark, which is to take place in the near future.

Plan Removal of Air King Factory

Plant to Be Transferred From Lomax to New Field Near Peoria

PEORIA, ILL.—Bernard J. Kelly, vice president and general manager of the National Airways System, Inc., makers of the Air King plane, announces that the company's plant at Lomax will be transferred to a site west of this city, where a 137 acre field has been secured under option at a cost of about $60,000.

Work is to be started immediately upon buildings which will house the company's executive offices, designing room, and show room. In addition the company will maintain and operate an airport at the site. Several hangars, each of six planes capacity, with a warehouse and spur on the Rock Island Lines tracks, are included in the project.

The new Peoria factory is scheduled to begin producing at the rate of 15 planes a week. The National Airways only recently added a new Air King, "Mono 4," to its line with accommodaltions for four passengers. This plane is equipped with the Whirlwind engine. Mr. Kelly expects to have one of these planes at his disposal within a fortnight.

S. F. Tannus, president of the company, in a recent communication with Mr. Kelly indicated that the company expected to have between 400 and 600 men employed in its plant within six months after it opens. Jameson and Harrison of this city are architects for the new factory, scheduled to be completed by January 15. The National Airways is a $1,000,000 corporation.

Many Products Shown At Springfield Exhibit

SPRINGFIELD MASS.—A large number of airplane operators and accessory interests exhibited products at the aircraft show held in connection with the recent Eastern States Exposition. A huge tent housed these displays.

Among the exhibitions were a Loening Amphibian of the Navy, two gliders from the Provincetown school recently organized, several of the light commercial planes, beacons, floodlights, engines, and clothing. A. L. Guffanti headed the air show committee. Mr. Guffanti, a flier during the war, is a member of the Flying Club of Springfield.

S. A. E. Holds Aviation Meeting

NEW YORK, N. Y.—Commercial aviation was the subject of the meeting of the Metropolitan Section of the Society of Automotive Engineers, held September 27 at the Park Central Hotel.

Packard Tests Diesel Engine

Makes First Successful Flight of Plane With Oil Burning Power Plant

DETROIT, MICH.—According to an anouncement made by the Packard Motor Car Co., initial and successful experiments on a Diesel type radial air cooled engine were conducted here recently by the company. The engine has a weight per horsepower of less than 3 lb., eliminates fire hazard entirely and is said to carry a plane 25 per cent. further per pound of fuel than the present types. The Packard Diesel Aircraft engine is the first of its type ever built and successfully test flown in a plane.

The new engine, upon which the Packard company has been working for several years, develops 200 hp. It was installed and test flown in a standard Stinson-Detroiter monoplane at the company's proving grounds near Utica, Mich. Walter Lees, Packard pilot, and Captain L. M. Woolson, chief aeronautical engineer of the Packard company, conducted the two flight tests.

Two Flights Made

Lees and Woolson took off on the first flight, circled the proving ground for some time, then landed. Without stopping the engine they took off again to demonstrate it before a group of officers and directors of the company. Included in the group were Frederick M. Alger, Henry M. Bodman, Richard P. Joy, James T. McMillan, Truman H. Newberry; Col. J. G. Vincent, president of the Packard company; M. A. Cudlip, E. F. Roberts, and Alfred Moorhouse.

Application of the Diesel principle has eliminated gasoline, spark plugs and ignition system and carburetor. The new Packard engine, in fact, is said to have fewer parts than even the simplest gasoline aircraft engine.

Elimination of the electrical ignition system makes it possible to utilize interplane radio communication without the usual interference from that source. Another obvious advantage is the reduction in fuel costs which results in important savings in operating expense.

Weight was Problem

Although engineers the world over have sought for years to adapt the Diesel principle to aircraft use, the idea has generally been regarded as futile, due to the great weight per horsepower believed necessary for the engine's successful operation. The Packard reduction on this weight has been brought down to 3 from approximately 100 lb. per hp.

While it has been rumored for several months that the Packard company and a number of other well known automobile and engine manufacturers were experimenting with Diesel type airplane engines, nothing definite could be learned about the experiments. Details of the present engine are not available at this time, the company stating they planned to conduct an exhaustive series of tests, both on the ground and in the air, before offering the engine to airplane manufacturers and engine distributors.

The Packard company has been engaged in airplane engine manufacture for 15 years and has pioneered in many of the most important contributions to this field, including the original design and construction of the famous Liberty engine.

Lets Passenger Handle Controls

BALTIMORE, MD. — A new dual control Monocoupe plane was recently obtained by the Chesapeake Aircraft Corp. here. Pleasure flying in the small plane has been popular, for the pilot has made a practice of letting the passengers hold the controls for a time during the flight.

Making F-10-A's at Wheeling

HASBROUCK HEIGHTS, N. J.—The Fokker Aircraft Corp. of America recently completed two additional airplane plants for the manufacture of commercial aircraft. The newly-equipped plant at Wheeling, W. Va., is at present turning out a number of F-10-A tri-engined 14 passenger monoplanes capable of 150 m.p.h. A second plant is being operated at Passaic, N. J., in addition to the flying field and factory here.

Alameda Firm Named Curtiss Robin Dealer

ALAMEDA, CALIF.—C. H. Griffin, sales manager of the Curtiss Robertson Aircraft Co., closed, during the Los Angeles aircraft show, a contract with Alameda Airport Co. of Alameda, Calif., for the distribution of Curtiss Robin planes in Northern California. The contract provides for delivery of 20 Robins powered with OX-5 engines during the next six months.

The Alameda Airport Co. has a paid-in capital of $200,000 and owns and operates a new airport at Alameda across the bay from San Francisco which may be reached from that city in 30 min. by ferries of the Southern Pacific Railway. The company plans to operate an eight minute speed boat service between San Francisco and Alameda.

Officers of the Alameda Airport Co., are Capt. Chadwick Thompson, president; Capt. William H. Royle, operations manager; W. H. McHenry, sales manager; and J. C. Nickerson, secretary-treasurer.

Checks Four Stearmans

WICHITA, KAN.—B. D. Boozer of the airways division of the Department of Commerce, is in Wichita to check construction on the four Stearman biplanes being built for the Department. The first of these planes is to be delivered on September 28.

Two planes built by the Stearman company already have been delivered to the Department of Commerce to be used in the regulatory division of the Department's aeronautical section. The coming four are to be equipped with radio instruments by which trials will be made in night in "blind" flying.

Mail Taken on the Fly

Showing one of the successful tests of a new mail pick-up device. Guided into the "V" of this apparatus by the pilot, a cable automatically catches the sack, which is later brought into the cockpit by a winding drum.

R. S. Moore Designs 100 hp. Radial Engine

SCRANTON, PA.—Plans are under way in this city to form a corporation for the purpose of manufacturing a five cylinder, 100 h.p., radial aircooled engine designed by Robert S. Moore, who until recently was associated with the aeronautics branch of the Department of Commerce. Moore has had a long experience in aeronautical engineering and was associated with Emile Berliner more than 20 yr. ago.

It is expected that the first Moore Aeronautical Engine will be completed by January 1 and as soon as it has passed the Department of Commerce tests, production will be started at the plant of the F. Wesel Manufacturing Co. Paul W. Gardner, general manager of the Wesel company, who took the first steps in assuring the new project, is also endeavoring to establish in Scranton a firm engaged in the building of airplanes. Other members of the projected corporation are L. A. Watres, of the Chamber of Commerce; Frank Hummler, vice-president of the First National Bank; F. Wesel, president of the Wesel Company; R. B. McClave, secretary-treasurer of the McClave-Brooks Co. and R. S. Moore. The price of the engine will be about $2,000.

Toledo Holds First Aeronautical Show

TOLEDO, O. — Toledo's first aeronautical show was held from September 24 to 29 on all 10 floors of Lasalle & Koch's, the city's largest department store, which is affiliated with Macy's of New York.

Airplane engines and accessories were displayed on all floors with a Simplex Red Arrow and a Waco 10 OX-5 shown on the main floor. Instrument boards from the Glenn L. Martin Corp. also were shown. The Goodyear Co. of Akron sent a model Zeppelin to the show.

T. Duke Richards, with the Royal Flying Corps during the war, was brought here by the store to lecture before clubs and to answer all questions at the show.

Eddie Stinson, airplane manufacturer of Detroit, and Miss Katherine Fall, high school girl of Alliance, O., who learned to fly after only five half-hour lessons, were advertised as the headliners. Admission was free.

Model airplanes made by Toledo schoolboys were shown, while the new Transcontinental municipal airport, recently dedicated here, was reproduced in a window.

Detroit Club on Radio

DETROIT, MICH.—As a regular feature of its program the Detroit Flying Club recently inaugurated a series of weekly talks on aviation over radio station WBMH, Detroit. The club goes on the air each Thursday evening. Maj. E. F. Hinkle, a member of the Lafayette Escadrille during the war, spoke recently.

Plan to Discuss Airport Paving

WASHINGTON, D. C.—It has been announced that the subject of airport paving will be considered at the next meeting of the Asphalt Paving Conference to be held in New Orleans, La., the week of December 3.

Among those who are expected to participate in the airport session are William P. MacCracken, assistant secretary of commerce in charge of aeronautics; Col. H. H. Elee, engineer for the Aeronautic Branch, Department of Commerce and several consulting and construction engineers prominent in the work of designing and building commercial and municipal airports. Discussion of this comparatively new phase of asphalt construction is made necessary by the fact that asphalt paving for landing strips, runways, hangar floors, roads, etc., is being widely adopted in the construction of the country's new airports.

New Oxwelding Uses Found in Production

NEW USES in the production field are being found continually for the oxy-acetylene process and its value for this purpose is steadily increasing. When the process was first introduced it attracted considerable attention because of its effectiveness and economy in repair work on machinery and metal parts. It soon became evident, however, that oxy-acetylene welding could be made to play an important part in production and at present the output of a large number of plants manufacturing many different products depends largely on the process.

This is also true of the smaller contract welding shops, many of which are seeking work in production rather than miscellaneous repair work. The more progressive proprietors of these shops are finding opportunities in this direction which provide steady profit. Even though it may seem small per unit it will amount to more in the long run than the apparent high returns on scattered repair work.

Flightex Business Expands

NEW YORK, N. Y.—Mr. Edmund S. Twining has resigned from F. B. Keach & Co., member of the New York Stock Exchange, to become actively associated with E. S. Twining & Co. of New York City, manufacturer of Flightex Fabric and tapes. This is due to the expansion of the latter business.

Named Supreme Agent

MARSHALL, MO.—The Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo., has been awarded the sole distribution rights for the Supreme propeller in the mid-western territory.

Reviews

The Book Department, Aviation, 250 West 57th St., New York City, can supply all books mentioned except government publications. N.A.C.A. publications may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

* * *

Principles of Transportation is the title of a new book, which presents a comprehensive study of the business principles and practices employed in water, motor, rail and air transportation. It describes the special work of each, and demonstrates that maximum service to the public will be obtained by a co-ordination of all the various systems.

Part VII deals with air transportation. The development of aviation, commercial air transportation, the air mail service and regulations governing air transports are described and discussed in the chapters comprising this section of the book.

The authors of the book are Emory R. Johnson, Ph.D., Sc.D., dean and professor of transportation and commerce; Grover G. Huebner, Ph.D., professor of commerce and transportation; and G. Lloyd Wilson, Ph.D., also a professor of commerce and transportation. All are connected with the Wharton School of Finance and Commerce at the University of Pennsylvania. The price of the book is $5.00.

* * *

20 hrs. 40 min. This is the title of a book by Miss Amelia Earhart, describing her flight across the Atlantic in the tri-engined Fokker monoplane, "Friendship." She tells of her experiences in learning to fly, of the preparations for the trans-Atlantic flight, and of the actual trip across. The description of the flight is taken from her log book.

In addition, there is a chapter entitled, "Aviation Invites," This is an appraisal of aviation today and of its future prospects. Besides this, Miss Earhart tells of the possibilities for women in aviation. In the last chapter, she tells of Wilmer Stultz, who piloted the Friendship, and of Louis E. Gordon, the flight mechanic. The price of the book is $2.50.

* * *

Army Air Corps Information Circular No. 597. Section Properties of a Series of Airfoils for Propeller Design, prepared by Frank W. Caldwell, Material Division, Air Corps, Wright Field, Dayton, O.

Section properties of a series of airfoils similar to the Clark Y. are given. These sections are all based on the same median line, the camber ratio being varied. The area, statistical moment about the two axes, moment of inertia about the two axes and center of gravity of each of the sections are given.

* * *

National Advisory Committee for Aeronautics Technical Memorandum No. 473

The Problem of Noise in Civil Aircraft and the Possibilities of its Elimination, Part I. By W. S. Tucker. From the Journal of The Royal Aeronautical Society, March, 1928.

AIRPORTS AND AIRLINES

Coast Trail Has Two New Fields

Route via Albuquerque, N. M., and Amarillo, Tex., Offers Advantages

AMARILLO, Tex.—Completion of the airports in Amarillo and Albuquerque, N. M., makes available a new route for transcontinental fliers. Among the advantages claimed for the new trail are the enabling of low altitude flying, excellent conditions as to weather, smooth country for landings, and good servicing facilities at the airports.

The Amarillo Airport has been put into first class condition with complete facilities. Between this field and that at Albuquerque there are many emergency landing tracts, and at Albuqurque itself the same class of airport and service is maintained as at Amarillo. The Airway Holdings Corp. operates these two airports.

An air taxi service is offered at the Amarillo field with a Ryan Brougham and Monocoupe planes, while some 30 students are enrolled in the flying school which employs a Hisso Travel Air and Monocoupes for training. Cooperation in this development has been received from Mayor Bivins, whose son flies a Whirlwind Travel Air, using the craft to inspect his ranches and oil interests.

Scenic Airways, Inc., which offers flights at the Grand Canyon, is now operating a school and taxi service at the Albuquerque Airport. A hotel, furthermore, is being erected at this field to accommodate fliers.

In continuing to the West Coast, transcontinental fliers will find an excellent field at Flagstaff, Ariz., as well as several good ones on the route to Needles, Calif., especially at Seligman and Kingman, Ariz.

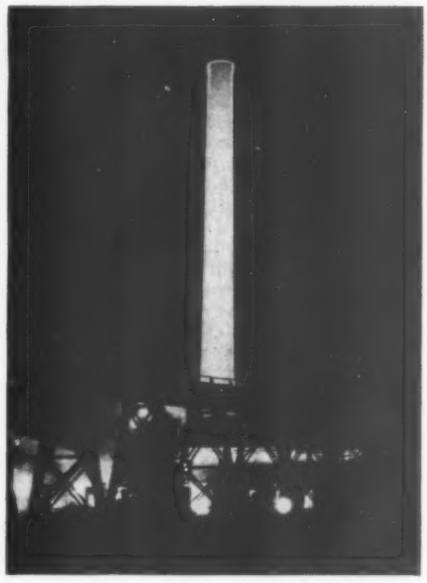
To Open Council Bluffs Field

COUNCIL BLUFFS, IA.—An airport will be dedicated here by the Council Bluffs Aero Club on Friday and Saturday, September 28-29. Service planes from Selfridge Field, Mount Clemens, Mich., and from Marshall Field, Fort Riley, Kan., will participate as well as a number of commercial and private planes.

P. A. A. Line Starting Date Set

MIAMI, FLA.—Miami-Porto Rico air mail service will be inaugurated December 15, J. M. Eden, traffic manager of Pan-American Airways, Inc., announces.

Chimney a Beacon



A unique aerial beacon is found in this 300 ft. floodlighted stack of the Universal Portland Cement Co. at Buffington, Ind., near Chicago.

Hamilton Planes to Cut Universal Flying Time

MINNEAPOLIS, MINN. — Starting Oct. 1, the flying time of planes on the Minneapolis-Chicago division of the Universal Air Lines System will be cut a full hour, officials of Northern Air Lines, operating the division, have announced. This will be done by replacing present equipment with Hamilton all-metal planes, with a cruising speed of 115 m. p. h.

Planes will leave here at 11:30 A. M., instead of 10:30, as at present, and arrive in Chicago at 3:15 P. M. On the return, the plane leaves Chicago at 10:30 A. M., arriving here at 1:30 P. M. This run is part of the recent air-rail hookup announced by the Air Lines company and the New York Central railroad.

Start New Jersey Coast Line

ATLANTIC CITY, N. J.—Atlantic Coast Airways, Inc., inaugurated its New York-Atlantic City air passenger service on Sept. 22, making the flight from the Metropolis in 1 hr. 16 min. Eleven passengers were carried in the twin-Liberty engined Curtiss flying boat with Saunders Davis and Lieut. H. Schaffer piloting. Regular service between the cities will be started, it is said, when the two terminals are equipped.

Installing Lights At Boise Airport

Varney Plans Hangar for Planes to Be Used in New Service

BOISE, IDA.—The lighting of Boise's airport should be completed and ready for use shortly, said Paul Spangenberg, in charge of local installation.

The plan of lighting calls for boundary lights every 190 ft. around the circuit of the field. The beacon, on a tower, will flash every 10 sec. Permanent obstruction lights will be placed on all buildings, poles and other hazards. The flood light, the most powerful of the entire equipment, will be used only when a plane is landing.

A temporary structure is to be erected to house the control switches. Later this will be replaced by a permanent building. On completion of this housing unit at the Boise Airport, an attache of the weather bureau with his instruments will take up his duty of supplying weather reports any time during the day or night.

The manager of the Boise Airport has laid out a "dead line," behind which all buildings must be erected. Past this automobiles or foot traffic must not go.

Russell Owen, the flying sheep-herder, who is at present engaged by the Boise Flying Club as its instructor, is building a small hangar at the west side of Varney's. Plans are being worked out now to build a large hangar to house the giant passenger planes that will be placed in service when the Varney Airlines begin their new passenger flying.

Airway Markers for Rochester

ROCHESTER, N. Y. — A movement is under way by the Rochester Chamber of Commerce Aviation Committee to place a number of markers in and around the city for the guidance of fliers. At present four have been completed on building roofs, the largest being located on the gas tank of the Rochester Gas and Electric Corp. six miles from the city airport.

Navy Awards Hangar Contract

WASHINGTON, D. C.—The Navy Department has awarded a contract for construction of a seaplane hangar to the Newport News Contracting and Engineering Co. The hangar is to be erected at Coco Solo, Panama Canal Zone at a cost of $178,750.

Oil Firm Picks Oregon Sites for Beacon Chain

PORTLAND, ORE.—Sites for Oregon's share of the first links of the 36 beacon chain with which the Richfield Oil Co. plans to span the Pacific Coast have been chosen. They will be near Hood River, Salem, Eugene, Roseburg, and Medford. The next beacon north of Portland will be near Castle Rock, Wash.

Each beacon will be on a tower 125 ft. high and will have 1000 ft. of neon tubing. Claim of visibility for 100 mi. is made for the lights. They are to be built by the Electric Products Corp.

The Richfield Oil Co., furthermore, has erected a gigantic sign spelling "Richfield" on which Claude Neon Tubes are being placed by the Electrical Products Corp. The sign, standing on the highest hill in Portland and facing east has letters 60 ft. high with the word itself 725 ft. across. The display stands on poles some of which are 120 ft. high, and the electrical company claims the sign will be visible to pilots at least 100 mi. distant.

Tulsa-Kansas City Air Line Starts October 5

WICHITA, KAN.—On October 5, daily air passenger service between Tulsa and Kansas City, with Wichita as the only stop, will be inaugurated by the Air Transportation Corp. of Wichita, according to N. L. Sifers, president.

Two Laird Whippoorwills, three passenger cabin biplanes, have been purchased and a new seven place Travel Air monoplane has been ordered. J. M. McConaughey and Tip Shier it is reported, have been engaged as pilots. Mr. Sifers has charge of production in the Laird Aircraft Corp. of Wichita and is not associated with the E. M. Laird Airplane Co. of Chicago as incorrectly stated recently.

Yale Students at Brainard

HARTFORD, CONN.—It has recently been announced by Lieut. Harry D. Copland of the Interstate Airways, Inc., that about 30 members of the Yale Aeronautical Society will get their flying instruction at Brainard Field this year.

About 45 students received instruction in flying at Brainard Field last year and many of them received their licenses. Lieut. Jack Tweed will instruct in seaplane flying while Lieutenant Copland will take care of the land flying.

Universal Reports Traffic

DULUTH, MINN.—During August the Universal Air Lines carried 57 passengers during 19 trips in their pontoon equipped Fairchild on the run between Lake Calhoun in Minneapolis and the Saint Louis Bay in Duluth.

Speedboats for Air Mail Line

OAKLAND, CALIF.—With the opening of a speedboat canal from Oakland Airport to San Francisco bay, transcontinental air mail delivery from Oakland to San Francisco will be speeded up approximately a half hour, according to local city officials. The canal wil be ready early in November it is announced.

A speedboat will await mail planes at the field end of the canal and carry the mail across the bay. At present the mail is placed on a fast truck at the Oakland field and sent across the bay by ferry.

Columbus Selects Site For Municipal Airport

COLUMBUS, O.—A tract of more than 1,000 acres just north of the Baltimore & Ohio and the Pennsylvania tracks has been selected by the city airport commission as a site for the new municipal airport. It was approved by Col. Charles A. Lindbergh, Phil Love, and H. C. Ferguson, consulting engineers of the T. A. T. Citizens will vote on a $850,000 bond issue on November 6 for purchase of the site.

Maj. Thomas G. Lanphier, vice president in charge of operation of the T. A. T., told the airport commission on September 18 that the company plans to make Columbus the eastern air terminal of its coast-to-coast train-plane service, which will begin operations in April.

Sixteen sub-committees have been named by Floyd Green, chairman of the local airport commission, to work for a favorable vote on the bond issue.

District of Columbia Legion Acquires Field

WASHINGTON, D. C.—The District of Columbia Air Legion, a cooperative organization of student aviators in training to obtain transport airplane licenses, has leased the Windham Estate, two miles north of Silver Spring, Md., as a landing field, announces Edward L. Brimley, secretary. Members will begin the construction of a hangar immediately. Each member of the legion will be required to bring one sack of cement and to wheel one wheelbarrow load of gravel or sand to the site.

Army Aid at Augusta Opening

AUGUSTA, ME.—With six Army planes maneuvering overhead, the Augusta Airport was dedicated on Sept. 22. More than 3,000 persons were present. The aircraft participating in the ceremonies were escorted to the field by Maj. Gen. Preston Brown, commander of the First Corps. Area, and Lieut. Donald Duke, commander of the Boston Airport.

Say Ford Backs Philadelphia Field

Report Work on 140 Acre Airport Site Will Be Started in October

PHILADELPHIA, PA.—It is reported here that a Philadelphia air terminal to cost between $1,000,000 and $1,500,000 and to accommodate both passengers and freight is to be erected here by Ford interests. The announcement is credited to Stuart A. Howard, representing a group of Detroit bankers.

The Philadelphia Air Terminal, Inc., is the name taken by the company, and a site of 140 acres has already been chosen in South Philadelphia, a distance of slightly more than three miles from the City Hall. The field is to have six runways 2,300 to 2,500 ft. in length, with special care taken to provide full drainage.

Work on the site, to begin in October, should be completed by May, and at that time, it is said, the Stout Air Service, Inc., will inaugurate a regular passenger and freight service between Philadelphia and Pittsburgh, Buffalo, Cleveland, Detroit, and Chicago. Company officials also say that Sky View Lines, operating Ford planes, will offer short flight service from the airport.

The new field lies in the vicinity of the Sesqui-Centennial grounds between Fifth and Swanson Streets and Packard and Pattison Avenues.

Congressional Airport Capital Office Opened

WASHINGTON, D. C.—Closely following the filing of incorporation papers at Baltimore, the Congressional Airport, Inc., which is now creating a large airport, and commercial flying service, and training school just across the Maryland line near Washington, has opened offices in the Transportation Building.

The incorporation papers list Maj. Harry M. Horton as president, Lieut. John H. Tilton chief pilot, and officer in charge of chief flying operations, as vice president and George Peter of Rockville Md., as secretary and treasurer.

Start Havre de Grace Line

WASHINGTON, D. C.—A special race track airplane passenger service between Washington and Havre de Grace, Md., has been put into operation from Hoover Field by the Potomac Flying Service. Two Eaglerock planes made the initial flight, and a new Fairchield plane will be placed in service immediately. Landings at Havre de Grace are made on an emergency field laid out by the Department of Commerce on the coastal airway.

FOREIGN ACTIVITIES

Autogyro Flown Across Channel

Inventor Reaches France in 20 Min. With 90 M. P. H. Speed Average

PARIS, FRANCE.—A long step forward in experimentation with the Autogyro was taken on September 18 by Juan de la Cierva, the inventor, when he flew his unique craft from Croydon Airdrome, London, to Le Bourget Field, Paris. Accompanied by Henri Bouche, editor-in-chief of L'Aeronautique, Senor de la Cierva took off from Croydon at 10:05 A.M., made a brief stop at Lympne Field, Kent, then crossed the Channel in 20 min. and landed at St. Inglevert at 11:06 A.M.

At 12:53 P.M. Senor de la Cierva again took the air and flew to Abbeville from which point he continued to Le Bourget Field, arriving at the latter airport at 4:20 P.M. A spectacular landing in which the Autogyro descended steeply, yet easily, and came to a stop after only a few yards run, was reported at Le Bourget.

Passed Heavier Plane

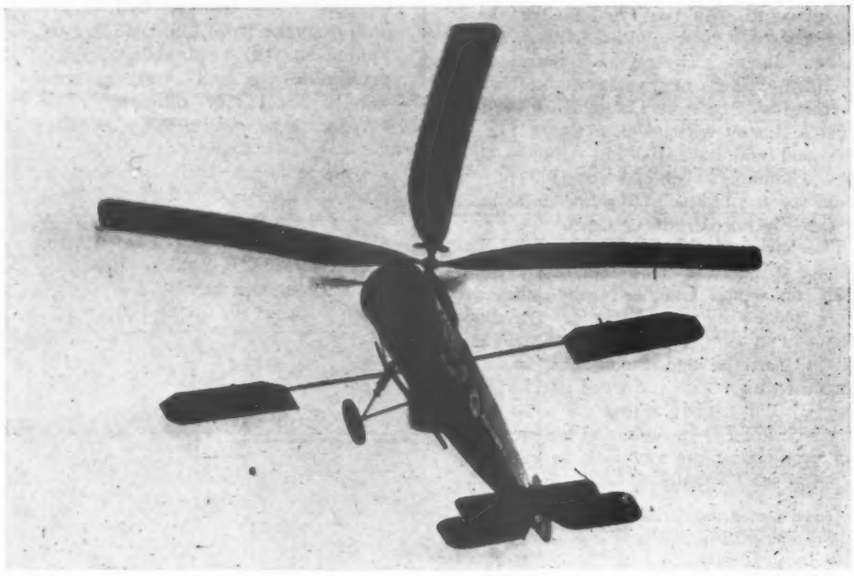
The two fliers were accompanied for some distance on their fight by a large London-Paris Air Union commercial plane. During this period, the Autogyro is said to have passed the heavier Air Union craft, at times attaining speeds of more than 105 m.p.h. The average speed for the flight was put at 90 m.p.h., while the altitude maintained by Senor de la Cierva approximated the 4,000 ft. level in the Channel crossing.

It was de la Cierva's plan to continue to other Continental cities in the Autogyro, but in landing after a demonstration on September 20, the craft was wrecked. De la Cierva and Franz Reichel, his passenger, suffered only minor bruises in this accident, said to have been caused by a broken landing gear cable rather than by any fundamental weakness in the aerodynamic design of the plane.

Has Many Improvements

Many improvements over the Autogyro which Capt. F. T. Courtney successfully tested in 1925 have been made in the new craft, it is reported. The fundamental design, however, is the same. Incidentally, the present Autogyro is already credited with a 3,000 mi. journey around England made in August, A. H. Rowson piloting it in this trip.

A company has been formed in England to manufacture the Autogyros, and the Royal Air Force has ordered several. Juan de la Cierva plans, furthermore, to make tests with some new light types of Autogyro designed for air tourist use.



Flight picture of de la Cierva's Autogyro showing four-bladed wind vane from which it obtains lift.

As shown in the accompanying photograph the Autogyro consists of an avro fuselage with the conventional engine and propeller and ailerons on each side attached by short struts to the lower fuselage longerons. It is supported in flight by a four bladed wind vane mounted on a mast in front of the pilot and attached to a vertical shaft. This wind vane is not driven by the engine but is left free to rotate under the impulsion of the air streaw generated by the propeller.

The blades of the wind vane are constructed in airfoil section and set at a fixed angle relative to the axis of rotation but they are hinged to the bearing shaft in such a way that they place themselves in different positions according to their lift and centrifugal forces producing the effect of automatic incidence adjustment.

Builds New Napier Racer

LONDON, ENGLAND.—A new Supermarine Napier racing seaplane, designated the S-5, will be used in an attempt to break the world's speed record of 318 m. p. h., which is now held by the Italians. The new plane is expected to attain a speed greater than 320 m. p. h. It is powered with a Napier engine which is said to develop more than 1,000 hp.

Australian Firm Buys Moth

MELBOURNE, AUSTRALIA. — A DH Moth plane has been purchased by the Louis Cohen Wireless Co., Ltd., to be used for commercial traveling purposes.

Service Started Over Peru-Honduras Line

LIMA, PERU.—Officially opening the first link of a projected mail route extending from Peru to the Canal Zone, a plane recently flew from this city to Talar, Honduras, carrying a sack of mail. This line is to connect with Central American routes promising a saving of two weeks time between Lima and New York City.

The present system, complementing the San Ramon-Iquitos route, both operated by the Huff-Daland Dusters, subsidiary of the Keystone Aircraft Corp., Bristol, Pa., was opened subsequent to permission granted the operators by the Peruvian Government.

Coincidental with the opening the first leg of the new line, Captain Grow, acting Inspector General of Peruvian aviation, made anouncement to the Ministry of the Interior that the San Ramon-Iquitos air mail, express, and passenger route is now utilizing six Keystone "Pronto" planes to maintain a semi-weekly schedule with all available facilities booked many weeks in advance. Three additional planes of the same type, powered by Whirlwind engines have been ordered to augment the fleet.

"Graf Zeppelin," Tested

BERLIN, GERMANY. — Many test flights have lately been successfully made in the great new dirigible "Graf Zeppelin" recently completed. It is now said a flight across the Atlantic to America will shortly be made in the craft with a mail load and passengers.

Dominion Aircraft Operators Listed

Province of Ontario Has 23 of 44 Companies Now Listed

OTTAWA, CANADA—Forty-four operators of aircraft in Canada and their addresses are listed in a recent report issued by Trade Commissioner Thiemann of this city. Of this number, 10 are located at Toronto, four at Montreal, and three at Hamilton. The others are scattered.

Ranked according to province, Ontario leads with 23, or more than half the number, while Quebec is second with 12. The others are Alberta 3, British Columbia 2, Saskatchewan 2, and Manitoba and Yukon each one.

The list is as follows:

British Columbia Airways, Ltd., 900 Fort St., Victoria, British Columbia; Canadian Airways, Ltd., Three Rivers, Quebec—also 919 Keefer St., Montreal, Quebec; Canadian Transcontinental Airways, Ltd., 111 Cote de la Montagne, Quebec; Compagnie Aerienne Franco Canadienne, 266 St. James St., Montreal, Quebec; Dominion Airways, Ltd., 1303 Vancouver Block, Vancouver, British Columbia; Elliott Air Service, "International Airways," Box 275, Hamilton, Ontario; Fairchild Aviation, Ltd., Grand Mere, Quebec; F. F. Gillies, Gillies Battery Service, Kitchener, Ontario.

Lethbridge Firm in Alberta

Lethbridge Commercial Airways, 1235 Fifth Ave., A. South, Lethbridge, Alberta; London Air Transport, Ltd., 14 Fullerton St., London, Ontario; Ontario Provincial Air Service, Parliament Bldg., Toronto, Ontario; Universal Air Industries, Ltd., 1011 McCallum Hill Bldg., Regina, Sask.; Western Canada Airways, Ltd., Union Trust Bldg., Winnipeg, Manitoba; Yukon Airways & Exploration Co., Ltd., Whitehorse, Yukon; Patricia Airways, Ltd., Sioux Lookout, Ontario.

General Airways, Ltd., Rouyn, Quebec; Eastern Airways, Ltd., Rouyn, Quebec; Eastern Canada Airways, Ltd., 1006 Excelsior Lift Bldg., Toronto, Ontario; Northern Aerial Minerals Exploration, Ltd, Central Bldg., 45 Richmond St., W. Toronto, Ontario.

Leavens at Belleville, Ontario

A. D. Leavens, R. R. No. 4, Belleville, Ontario; W. H. E. Drury, 162 Ontario St., St. Catherines, Ontario; L. B. Sheppard, 18 Hurndale Ave., Toronto, Ontario; Purple Lable Air Line, Ltd., 206 P. Burns Bldg., Calgary, Alberta; The De Havilland Aircraft Co. of Canada, 1001 Federal Bldg., 85 Richmond St. W., Toronto, Ontario; P. Thibadeau, 628 Sewart Ave., Outremont, Quebec; E. Glassford, 165 Northcliffe Ave., Westmount, Quebec; Prospectors Airways, Ltd., Haileybury, Ontario.

R. B. Lloyd, 291 Albert St., Oshawa, Ontario; Chris. Evans, 511 Lauder Ave., Toronto, Ontario; W. K. Hogg & G. H. Trenholme, 371 St. Joseph St., Lachine, Quebec; Canadian Air Transport Co., 47 Third Ave., Ottawa, Ontario; R. Paget, Assiniboia, Saskatchewan; T. I. Trethewey, 53 Victoria St., Toronto, Ontario.

Skyview Lines, Ltd., Oaks Field, Chippewa, Ontario; J. Bailes & Sons, Ltd., 914 Excelsior Lift Bldg., Toronto, Ontario; D. Cushing, 555 Mount Pleasant Ave., Westmount, Quebec; Badgley, J. B. & L. Williams, Lake of the Woods Bldg, Montreal, Quebec; H. G. Marpole, 2058 Victoria St., Montreal, Quebec.

T. F. Williams, R. No. 1, Woodstock, Ontario; H. Mills, 50 Caroline St. N., Hamilton, Ontario; R. Foley, 49 Fairleigh Ave., Hamilton, Ontario; General Airways, Ltd., 97 Garfield Ave., Toronto, Ontario; Great Western Airways, Ltd., Calgary, Alberta; Canadian Air Express, Ltd., Bank of Hamilton Bldg., Toronto, Ontario.

Canada Buying U. S. Airplanes

OTTAWA, CANADA. — Imports into Canada of airplanes and parts in 1925, 1926, and 1927 indicate a steady rise in imports from manufacturers in the United States.

The figures reported are as follows: United Kingdom $29,282, $45,895, and $26,467; France $2,000, none, and $7,655; and for the United States $52,770, $72,226, and $83,878 for the respective years.

Air Service to Speed Canada-Europe Mail

MONTREAL, CANADA.—One to four days time will be saved in Canada-Europe mail transport by a new air mail service, contract for which has been let by the Canadian Post Office Department, according to Assistant Trade Commissioner France of this city. Steamers from Europe are to be met at Rimouski, a town on the upper St. Lawrence River, and mail taken off is to be speeded to Montreal and Toronto by plane.

Mail for European points, on the other hand, is flown to Rimouski to catch the outbound liner some time after it has left Montreal. Three to four days will be saved at times, it is said, due to connections made possible by the new service, since such intervals frequently occur between steamers.

A. A. S. Flies 627,000 Mi.

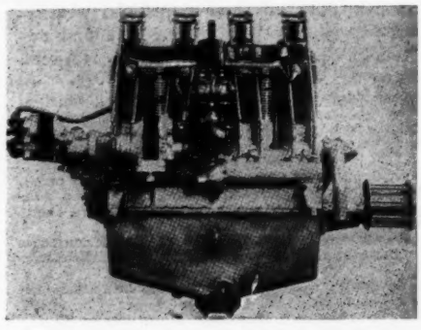
MELBOURNE, AUSTRALIA.—More than 627,000 mi. have been flown by Australian Aerial Services, Ltd., planes since the inception of the service in 1924, according to a recent report of the company. The company has a perfect safety record.

Cirrus Mark III Is in Production

New Engine Develops Higher Power Than Its Two Predecessors

LONDON, ENGLAND—A recent addition to the well known line of Cirrus engines, manufactured by A.D.C. Aircraft, Ltd., is the Mark III, which is now being produced by that company. The Cirrus Mark III has been developed to meet the demand for an engine of slightly higher power than the Mark II, which develops 75 to 80 hp. and is particularly adaptable to seaplane installation and operation at high altitudes.

The new Cirrus is similar in general design to the earlier models, being a four



Side View of the Cirrus Mark III

cylinder in line aircooled type, and is rated at 85-95 hp. It embodies several improvements, resulting in higher efficiency and is characterized by the same reliability and relatively low weight per horsepower as the former models. In accordance with the precedent established by the Mark I and Mark II engines it passed the type test of the Air Ministry immediately.

Proof of the high performance of this power plant was given in its first public appearance at the King's Cup Race. Two Mark III engines were entered in standard DH Moth and Avro Avian light planes and both completed successfully the 1,906 mi. course at full throttle all the way.

Flies 10,000 mi. in East Indies

KWARI, NEW GUINEA.—Dr. E. W. Brandes, head of the plant exploration expedition sent to the East Indies by the Department of Agriculture has completed his work after three months of exploration by airplane, canoe and on foot. Travel by the party included 10,000 mi. by seaplane.

Mail Line to Increase Service

BOGOTA, COLOMBIA.—After January 1, it is reported, the new Colombian-German Air Transports air mail service between Barranquilla, Colombia, and Guayaquil, Ecuador, will be weekly.

List of Canadian Fields is Issued

Locations, Descriptions, and Owners Given in Report By Commissioner

OTTAWA, CANADA.—Locations, descriptions, and names and addresses of owners of Canada's 39 airports are contained in a recent report issued by Assistant Trade Commissioner Thiemann at Ottawa. The landing stations are listed as follows:

Location: St. Hubert, Quebec. Description: Permanent airport and airship tower are now being constructed. There is no lighting accommodation and only one temporary hangar. Extinguishers constitute the only fire apparatus, repair facilities are in Montreal, there is no radio, and the appointment of an official weather observer is now pending. Name and address of owner: Department of National Defence, Ottawa.

Reid Airpark, Bois Franc, Montreal, Quebec. Hangars, gasoline and oil supplies, mechanics, and tile drained turf-covered surface. Reid Aircraft Co., Ltd., Reid Airpark, Bois Franc, Quebec.

Vickers Air Harbor, Montreal (seaplanes only). Accommodations for only flying boats and seaplanes. Canadian Vickers, Ltd., 3072 Notre Dame St., East, Montreal, Quebec.

Fredericton, New Brunswick, Public customs seaplane station, over 800 yds. City of Fredericton.

Lower St. Lawrence, commercial seaplane station, over 800 yds. Ontaria Paper Co., Ltd., 1005 Shaughnessy Building, Montreal, Quebec.

Granby, Quebec. Area about three-quarters mile square. Granby Aero Club.

Seaplane Station at Roberval

Roberval, Quebec. Commercial seaplane station, over 800 yd. Dominion Aerial Exploration Co., 786 King St., W., Toronto, Ontario.

Three Rivers, Quebec. Public Air Harbor, seaplanes. Canadian Airways, Ltd., 190 St. James St., Montreal, Quebec.

Lac a la Tortue, Qubec, Commercial seaplane station, over 800 yd. Fairchild Aerial Survey Co. of Canada, Grand'Mere, Quebec.

Haileybury, Ontario. Public seaplane station. Town of Haileybury.

Sudbury, Ontario. Commercial seaplane station, over 800 yd. Ontario Provincial Service, Forestry Branch. Parliament Building, Toronto.

Timagami, Ontario. Parliament Buildings, Toronto.

Remi, Ontario. Parliament Buildings, Toronto.

Como, Ontario. Parliament Buildings, Toronto.

Sault St. Marie, Ontario. Parliament Buildings, Ontaric.

Oba Lake, Ontario. Parliament Buildings, Toronto.

Orient Lake, Ontario. Parliament Buildings. Toronto.

Fort Frances, Ontario. Parliament Buildings, Toronto.

Sioux Lookout, Ontario. Parliament Buildings. Toronto.

Minaki, Ontario. Parliament Buildings, Toronto.

Airport at Detroit River

Detroit River. Commercial airport under 300 yd. O. H. Strickland, 7 Indian Road, Sandwich, Ontario.

Toronto, Ontario. Commercial airport under 300 yd. H. Watt, 112 Fairlawn Ave,, Toronto.

London, Ontario. Public airport. London Chamber of Commerce.

Ford, Ontario. Commercial airport, 400 yd. Bert McConnel, 154 Cadillac St., Ford, Ont.

Lake Osiski, Ontario, West Bay. Commercial seaplane station, over 800 yd. Northern Air Service. Ltd.. Haileybury, Ontario.

Hamilton, Ontario. Public customs airport, 600 to 800 yd. J. V. Elliott, foot of McNab St., Hamilton, Ontario.

Leaside, Ontario (Toronto). Public customs airport, 400 to 600 yd. Ericson Aircraft, Ltd., 45 Jarvis St., Toronto.

North Bay, Ontario. Commercial seaplane station, over 800 yd. Laurentide Air Service, Haileybury, Ontario.

Fairbank, Ontario. Commercial airport. Sufferin Air Service.

Winnipeg, Manitoba. Commercial airport, under 300 yd. Canadian Aircraft Co., Winnipeg, Manitoba.

Virden, Manitoba. Public customs airport, over 800 yd. W. A. Bridgett and H. N. Thompson, Virden, Manitoba.

Yorkton, Saskatchewan. Commercial airport, under 30 yd. D. Brown, Yorktown, Saskatchewan.

Regina, Saskatchewan. Commercial airport, over 800 yd. Aerial Service Co., Ltd., Box 285, Regina, Saskatchewan.

Moose Jaw, Saskatchewan. Public customs airport, 400 to 600 yd. City of Moose Jaw, Saskatchewan.

Saskatoon, Saskatchewan. Commercial airport, 600 to 800 yd. O. H. Clearwater, 212 Saskatchewan Crescent, Saskatoon, Saskatchewan.

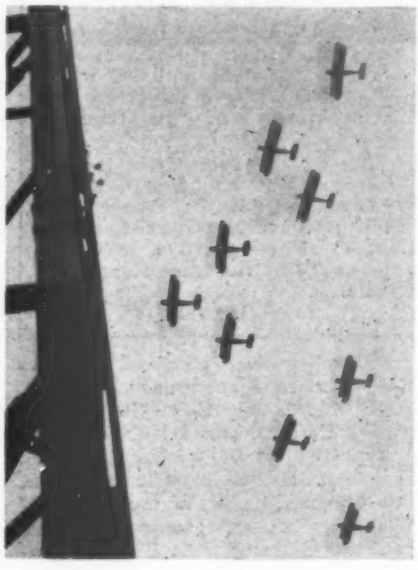
Lethbridge, Alberta. Public customs air harbor. Corporation of the City of Lethbridge, Alberta.

Lethbridge, Alberta. Commercial airport, 600 to 800 yd. Lethbridge Aircraft Co., 512 14th St., Lethbridge, Alberta.

Edmonton, Alberta. Public airport over 800 yd. City of Edmonton, A. W. Haddow, City Engineer, Civic Block, Edmonton, Alberta.

Victoria, B. C. Commercial airport, 400 to 600 yd. British Columbia Airways, Ltd.

Udet Formation



A squadron of Udet Flamingos passing one of the Tempelhof Airdrome radio masts during a recent exhibition at Berlin.

P'an Berlin-Nanking Line

CONSTANTINOPLE, TURKEY.—Baron von Huenefeld, in stopping here on his Berlin-Tokio flight in the Junkers monoplane Europa, revealed that Berlin is negotiating with the Nanking Government with a proposal to establish a direct Berlin-Nanking air service.

Propose Airport for Nanking

NANKING, CHINA.—Gen. Ko Chieng-en, chief of the military council staff office, and Chu Shaoliang, director of military administration, have proposed the establishment of a government airdrome here.

Dornier Building Giant Plane with 12 Engines

FRIEDRICHSHAFEN, GERMANY—A giant new Dornier plane which, it is said, will be powered by 12 Bristol Jupiter engines of 500 hp. each, is reported under construction on a special wharf at Lake Constance. The craft, designated as the Dornier 10, is to be ready for trial flights by December.

Early reports of the specifications put the fuselage length at 40 yd. and the span at 50 yd. The cruising speed of the Dornier 10 will approximate 115 m.p.h. and the maximum speed 149 m.p.h. It is estimated that the cruising range with full load of passengers and freight will be between 1,625 mi. and 2,500 mi.

The fuselage, of duralumin construction, is being formed in two stories, the lower one to accommodate more than 20 passengers with lounge, sleeping compartments, kitchen, etc. Officers and crew, totalling nine persons, are to navigate the plane from the upper story of the fuslage. Freight is to be stored in the latter section, it is said.

It is reported that the Dornier 10 will go to the German Trans-Atlantic Air Navigation Co. if tests prove successful. This firm, newly formed, is planning a German-South America service. Two other Dornier 10 planes are to be used by Italian interests for trade with the African colonies.

Report Air Traffic Statistics at Bremen

BREMEN, GERMANY.—During the second quarter of 1928, 587 landings were recorded at the Bremen Airport, with the planes carrying 1,048 passengers, 33,503 metric tons of freight and baggage, and 1,545 metric tons of mail and newspapers. Planes leaving the airport, on the other hand, carried 971 passengers, 30,059 metric tons of freight and baggage, and 1,661 metric tons of mail and newspapers in 605 takeoffs.

In addition, there were 231 local flights in which 74 passengers were carried. The traffic on regular services consisted of 353 planes arriving, carrying 854 passengers, 31,578 metric tons of freight and baggage and 1,545 metric tons of mail and newspapers; and 357 planes leaving carrying 755 passengers, 28,444 metric tons of freight and baggage and 11,661 metric tons of mail and newspapers.

The special flight consisted of 234 planes arriving with 195 passengers and 1,925 metric tons of freight and baggage; and 248 planes leaving with 216 passengers and 1,615 metric tons of freight and baggage.

Radio for German Planes

BERLIN, GERMANY.—Radio receiving and sending sets have been installed in all of the Luft Hansa multi-engined airplanes, it is announced here.

Dutch Lines Poundage Show High Increase

AMSTERDAM, HOLLAND—Despatch by regular air services is materially contributing to broaden the field of patronage of Dutch flowers, which arrive, in excellent condition, on foreign markets within a few hours from gathering, fetching remunerative prices. The total poundage, carried by Royal Dutch Air Lines (K.L.M.) in 1925 has been 22,000 lbs. only, but the results obtained by the Dutch firms induced them to introduce the flowers on other foreign markets and in 1927 the poundage, carried by K.L.M. air liners, increased to 285,000 lb. This year a new record will be reached, in one month, May last, the total having been 65,000 lb.

The advantages of air transport, including arrival on schedule, are also being appreciated by Dutch fruit growers, who during May last had 90,000 lb. of strawberries carried by K.L.M. aircraft, mainly to London markets.

Royal Dutch Air Lines has been among the first in Europe also to pay special attention to securing commercial freight business. Of the various classes of goods carried by the companies to the countries served by their craft, transport of such live stock as bees, chickens, and other poultry, deserve special mention.

Toronto Firm Seeking Land and Sea Airport

TORONTO, CANADA—A port available for both land and seaplanes is being sought by a local company, it is reported, on the Toronto waterfront. Facilities to be arranged at the proposed base would depend on the length of lease the company is able to obtain from the commission.

The location desired would be a two and one-half acre tract about 10 min. distant from the center of the city. The field will have complete lighting equipment, four hangars, and a marine railway for moving aircraft to and from the lake, if a satisfactory lease is awarded.

It is also proposed to construct a factory on the grounds for the manufacture of a light all-metal plane. This plane will be a cantilever monoplane capable of carrying three passengers and 200 lb. of baggage, and will sell for about $7,500. It will have special boat floats and retractable landing gear which will make it adaptable for either land or water.

Finish Philippine Air Survey

RIZAL, PHILIPPINE ISLANDS.—Members of the mapping personnel of the Sixth Photo Section, U. S. Air Corps., recently returned to their station here after completing a survey of 5,000 sq. mi. of the unexplored mountainous region of Luzon. Two DH-4B airplanes were used for the photographic work and a Martin bomber transported planes and supplies. A Loening amphibian, equipped for photography also assisted.

Mexican Line Mileage Is High

MEXICO CITY, MEXICO.—That a total of more than 35,000 mi. was covered by Mexican planes of the line operating between this city and Tampico and Tuxpan, is announced here. The flying time of this air mail, passenger, and express service totalled 368 hr. 29 min.

Canadian Flying Time Was Doubled in 1927

OTTAWA, CANADA—During 1927, commercial aero companies more than doubled their flying time, according to a report recently made here, while civil operations increased proportionately. Though the air has been used primarily as an improved medium of observation, more and more attention is being accorded air mail and passenger service.

Aircraft were used in Canada for such varied purposes as observing for the sealing fleets off the Newfoundland coast, forest dusting in Cape Breton Island, forest fire protection and fisheries patrol in the Far West, observation of ice conditions through the winter in Hudson Straits, transportation in the Yukon, and for air mail service.

The 1927 report on Civil Aviation in Canada states that more than 70 light planes are in use or on order for fire detection patrols and light transportation in Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, as well as for flying club and private use throughout the Dominion. The Department of National Defence has encouraged the formation of light airplane clubs and associations by furnishing such organizations with airplanes for the instruction of the members.

Germans Now Using Cellulose Lacquers

BERLIN, GERMANY—That German airplane factories use nitro-cellulose as well as cellulose acetate lacquers for coating airplane wings, and that a prohibition against their use does not exist in Germany as yet, is reported by the Experimental Institute for Aviation (Deutsche Versuchsanstalt fur Luftfahrt).

The Institute states further that it is most difficult to differentiate between the desirable qualities of both sorts of lacquers. With reference to the inflammability of nitro-cellulose, it is granted that wings treated with the latter burn somewhat more vigorously than those treated with cellulose acetate. In a stiff air current, however, fire does not spread, according to local observation, any more on a nitro-cellulose coating than on cellulose acetate, and is extinguished generally after a brief play on both types of coating. In preparing nitro-cellulose lacquers for airplanes here, attention is given to minimizing its inflammability, even in still air.

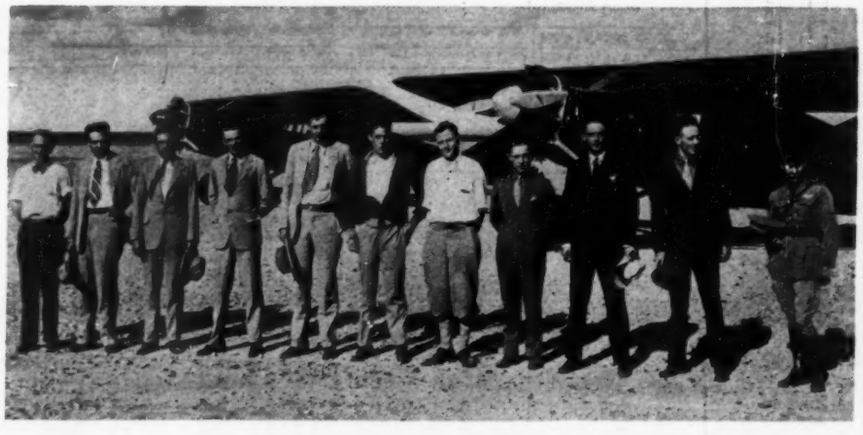
It may be noted finally that in practice, nitro-cellulose and cellulose acetate can be applied together, either in an original lacquer mixture or by being applied successfully as coatings.

Plan Danish Arctic Expedition

COPENHAGEN, DENMARK. — A dirigible balloon now under construction at Boden See will be used next year in the North Pole Expedition of the International Association for Aero-Arctic Exploration, under the leadership of Dr. Fridtjoff Nansen. Peter Freuchen, Danish Arctic explorar, will participate in the expedition which is for the purpose of meteorological research.

Fifteen scientists will be included in the party which will consist of 50 persons.

Stinsons for Mexican Mail



E. M. Walsh, Stinson mechanic (extreme left), and Clyde W. Stracher, Stinson pilot (fifth from right) with a group of Mexican fliers before two Detroiter planes bought for mail service between Mexico City and Nueva Laredo.

MANUFACTURERS' SPECIFICATIONS ON ENGINES AVAILABLE FOR COMMERCIAL USE AS COMPILED BY AVIATION

THE TABLE BELOW IS BELIEVED TO BE ACCURATE BUT *AVIATION* DOES NOT ASSUME RESPONSIBILITY FOR THE FIGURES GIVEN

This table will appear monthly and corrections and suggestions are invited

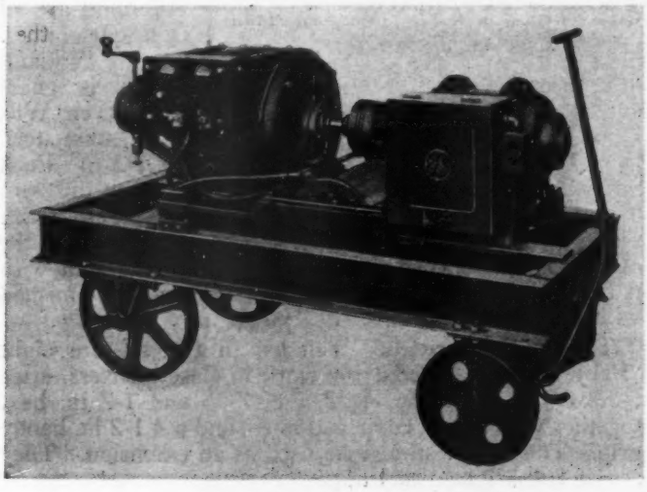
MANUFACTURER OR AGENT	Engine	Cooling System	Cylinder Arrangement	No. of Cylinders	No. of Cycles	Propeller Drive	Rated Hp. and R.P.M. at Sea Level	Maximum Hp. and R.P.M. at Sea Level	Weight Dry Without Hub or Starter	Weight Per Rated Hp.	Bore and Stroke (In.)	Compression Ratio	B.M.E.P.	Displacement (Cu. In.)	Frontal Area (Sq. Ft.)	Diameter of Mounting Ring or Distance Between Bearers (In.)	Height or Overall Diameter (In.)	Length Without Starter (In.)	Guaranteed Fuel Consumption at Rated Hp. Lb./Hp./Hr.	Oil Consumption Lb./Hp./Hr.	Valve Mechanism	Cylinder Construction (See Key)	No. Intake Valves Per Cylinder	No. Exhaust Valves Per Cylinder	Make Spark Plugs Supplied With Engine	Type of Ignition	Make Ignition	No. Carburetors	Make Carburetors	Make Starter	Are Exhaust Manifolds Provided	Shipping Weight Crated	Dept. of Commerce License	Cost at Factory
Aircraft Engine Co	Comet	A	Rad	7	4	D	150–1800				4½x5½										prr	Al, S	1	1		2M	Se		Sy.E	Ba			N		
Allison Engineering Co.	V1410	A	IV-45°	12	4	D	410–1800	430–1900	1000	2.44	4½x7	5.3	128	1410		17	46¾	78½	.55	.03	ohe	Al, S	1	1	BG	2B	De	1	Sg¹	ke			Y		
Allison Engineering Co.	V G1410	A	IV-45°	12	4	G¹	410–1800	430–1900	1125	2.62	4½x7	5	128	1410		17		85½	.55	.03	ohe	Al, S	1	1	BG	2B	De	1	Sg²	Ee			Y		
Allison Engineering Co.	V1650	W	IV-45°	12	4	D	420–1700	450–1800	9[illegible]	2.10	5 x7	5.4	122	1650		17	46⅛	74¼	.53	.025	ohe	Al, S	1	1	BG	2B	De	1	Sg²	Ee			Y		
Brownback Motor Laboratories, Inc.*	Ansani 3-35	A	Rad	3	4	D	35–1700	45–1800	115	3.29	3¹⁵⁄₁₆x4¹³⁄₁₆	5.1		119		9.5	24¹³⁄₁₆	21 ¹³⁄₁₆	.53	.025	prr	S	1	1		2M	AS		Z		N			$735.00
Brownback Motor Laboratories, Inc.*	Ansani 6-80	A	Rad	6	4	D	80–1500	89–1600	215	2.69	4½x4⅝	5.1		397		10.6	35¹³⁄₁₆	29	.53	.027	prr	S	1	1		2M	AS		Z		N			1650.00
Brownback Motor Laboratories, Inc.*	Ansani 10-120	A	Rad	10	4	D	120–1500	131–1600	320	2.67	4½x5½	5.5		736		11.0	43⅛	34¹¹⁄₁₆	.60	.031	prr	S	1	1		2M	AS		Z		N			2170.00
Curtiss Aeroplane & Motor Co.	OX-5	W	V-90°	8	4	D	90–1400		375	4.17	4x5	4.9		502		12⅞			.55	.030	prr	Mo, C	1	1		1M			Z		N		Y		
Curtiss Aeroplane & Motor Co.	OXX6	W	V-90°	8	4	D	110–1900		390	3.55	4½x5	4.9		568		12½			.55	.030		Mo, C	1	1		2M			Z		N		Y		
Curtiss Aeroplane & Motor Co.	C-6A	W	L	6	4	D	160–1700	165–1750	420	2.62	4½x6	5.2	123	573		15¾	39	57¹⁵⁄₁₆	.53	.015	ohe	Al, Al, S	2	2	AC	2M	Sp	1	Z	U	N	865	Y		
Curtiss Aeroplane & Motor Co.	D12	W	V-60°	12	4	D	435–2300	460–2500	680	1.47	4½x6	5.3	135	1145		15¾		56¾	.53	.015	ohe	Al, Al, S	2	2	BG	2M	Se	2	Sg	1 e	N	1080	Y		
Curtiss Aeroplane & Motor Co.	Conqueror	W	V-60°	12	4	D	600–2400	635–2450	760	1.26	5½x6½	5.8	130	1569		15¾		56¾	.52	.015	ohe	Al, Al, S	2	2	BG	1M	Sp	2	Z	Ee	N	1060	Y		
Curtiss Aeroplane & Motor Co., Inc.	Geared Conqueror	W	V-60°	12	4	G²	600–2400	625–2450	850	1.42	5½x6½	5.8	128	1569		15¾		56⅛	.52	.015	ohe	Al, Al, S	2	2	BG	1M	Sp	2	Sg	Ee	N	1150	Y		
Dayton Airplane Engine Co.	Bear	A	L	4	4	D	110–1550	125–1800	375	3.41	4½x7	5.3	118	444		16	39	47⅝	.505	.0175	ohe	Al, NI	1	1		2M	Sp	1	Z	N	N	550		$1600
Fairchild Caminez Eng. Corp.	Caminez 447-C	A	Rad	4	4	D	120–960	140–1050	350	2.50	5½x4½	5.0	120	447	3.9	21½	36	35	.55	.035	prr	Al, S	1	1	AC	2M	Se	1	Sg¹	Ee	X	775	Y		
Hallet Mfg. Co.	H-526	A	Rad	7	4	D	130–1800		425	3.26	4½x5	5.2		526		18½	46	37			prr	C	1	1	BG	2M	Sp	2	Z		N		N		
Irwin Aircraft Co.	Irwin 79	A	Rad	4	2	D	20–1700	25–2200	60	3.00	2¾x2¾	5.0	110	79	2.0	4¾	22	11	.45	.031	Au	Aa, Aa, S	1	1	RB	1M	RB	1	Wf		N	100	N	$625
Kinner Airplane & Motor Corp.	K-5	A	Rad	5	4	D	75–1725	112–1880	268	2.30	4.25x.5.25	5.0		372		14	42				prr	Al, Al, S	1	1	CH	2M	Se	1	Sg	H	Y	400	Y	$1875
Menasco Motors Co.	B-2 Salmson	A	Rad	9	4	D	260–1500	278–1760	542	2.08	4.92x6.69	5.2						49½	.42	.025	prr	Al, S				2M	O	1	Z					$3,250
Axelson Machine Co.	Axelson	A	Rad	7	4	D	150–1800		430	2.87	4½x5½			612			45½	38								M	Se	1	Sg			750	N		
O. E. Szekely Corp.	SR-3	A	Rad	3	4	D	40–1800	45.6–1900	148	3.7	4¼x4⅝	4.8	100	191	2.3	9⅞		23¾	.57	.030	prr	C	1	1		2M	BR	1	Z	N	N	205			
Packard Motor Car Co.	1A-2775	W	X.60°	24	4	D	1200–2600	1300–2700	1500	1.15	5½x5	7	150	2775	6.22	14¼	45⅛	78½	.52	.03	ohe	S	2	2	BG	4B	Se	4	Sg	O	Y		Y	28,000
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	D	600–2500	650–2700	760	1.26	5½x5½	5.5	140	1498	4.03	15⅝	38¹⁵⁄₁₆	62¹⁵⁄₁₆	.52	.015	ohe	S	2	2	BG	2M	Se	2	Sg	Ae	N	1275	Y	12,000
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	G	600–2500	650–2700	880	1.46	5½x5½	5.5	140	1498	4.03	15⅝	38¹⁵⁄₁₆	65	.52	.025	ohe	S	2	2	BG	2B	De	2	Sg	Ae	N	1390	Y	1[illegible]5
Packard Motor Car Co.	3A-1500	W	V-60°	12	4	D	600–2500	650–2700	780	1.30	5½x5½	5.5	140	1498	4.03	16½	38⅝	62¹⁵⁄₁₆	.52	.025	ohe	S	2	2	BG	2M	Se	2	Sg	Ae	N	1275	Y	12,000
Packard Motor Car Co.	3A-2500	W	V-60°	12	4	D	800–2000	835–2100	1160	1.45	6⅜x6½	5.7	135	2490	4.8	18¼	36½	69¾	.52	.015	ohe	S	2	2	BG	2M	Se	2	Sg	Ae	N	2150	Y	15,625
Packard Motor Car Co.	3A-2500	W	V-60°	12	4	G	800–2000	835–2100	1380	1.72	6⅜x6½	5.7	135	2490	5.1	18¼	36½	76½	.52	.015	ohe	S	2	2	BG	2B	De	2	Sg	Ae	N	2340	Y	19,375
Pratt & Whitney Aircraft Co.	Wasp	A	Rad	9	4	D	400–1900		670	1.67	5x5¾	5.2	124	1344		23⅜		43⅜	.55	.035	prr	Al, S	1	1	BG	2M	Se	1	Sg		N	1150	Y		
Pratt & Whitney Aircraft Co.	Hornet	A	Rad	9	4	D	500–1900		760	1.52	6¼x6¾	5.0	123.5	1690		23⅜		44⅝	.55	.035	prr	Al, S	1	1	BG	2M	Se	1	Sg		N	1325	Y		
Pratt & Whitney Aircraft Co.	Geared Hornet	A	Rad	9	4	G2	500–1900		835	[illegible]	[illegible]	5.0	123.5	1691		23⅜			.55	0.35	prr	Al, S	1	1	BG	2M	Se	1	Sg		N		Y		
Quick Motors Co.	Quick-Radial	A	Rad	9	4	D	125–1450		325	2.6	4.13x5.51	5		667		19⅝	36	36			prr	Al, S	1	1	CH	1M	Se	1	Z					$1750
Ryan Aeronautical Corp.*	Ryan-Siemens 5	A	Rad	5	4	D	70–1750	75–1850	258	3.68	3.94x4.72	5.6	110.5	287		14	40½	34	.50	.022	prr	Al, S	1	1	O	2M	O	1	Sm	RB	Y	630	Y	1,800
Ryan Aeronautical Corp.*	Ryan-Siemens 7	A	Rad	7	4	D	96–1750	102–1850	328	3.40	3.94x4.72	5.6	108.0	402		14	40½	32	.50	.022	prr	Al, S	1	1	O	2M	O	2	Sm	RB	Y	675	Y	2,340
Ryan Aeronautical Corp.*	Ryan-Siemens 9	A	Rad	9	4	D	125–1750	132–1850	382	3.05	3.94x4.72	5.6	109.5	517		14.6	40½	32	.50	.022	prr	Al, S	1	1	O	2M	O	2	Sm	RB	Y	720	Y	2,970
Tips & Smith, Inc.†	Super-Rhone	A	Rad	9	4	D	125–1450	133–1650	15	2 52	4½x5½	5.2		667	4.75	11		39	.31	.036	prr	S, C	1	1	Sp	1M	Dx	1	Z			400	N		
Velie Motors Corp.	Velie M5	A	Rad	5	4	D	45–1750	80–2000	210	2.63	4½x3¾	5.2		2[illegible]		12¾	32	27	.55	.025	prr	Al, S	1	1	AC	2M	Se	1	Z	Ee	Y		Y		
Warner Aircraft Corp.	Scarab	A	Rad	7	4	D	110–1850	120–1925	270	2.45	4½x4½	5.2	112	422		17	35½	27¼	.50	.01	prr	Al, S	1	1	AC	2M	Se	1	Sg		N			$2,485
Wright Aeronautical Corp.	Whirlwind J5	A	Rad	9	4	D	200–1800	225–2000	500	2.50	4½x5½	5.2	122	788		19¼	45	33¾	.53	.035	prr	Al, S	1	1	AC	2M	Se	1	Sg		N	1000	Y	4,980
Wright Aeronautical Corp.	Cyclone R1750	A	Rad	9	4	D	525–1900	560–2000	700	1.52	6x6½	5 0	130	1753		23½	53⅝	40½	.55	.035	qrr	Al, S	1	1	BG	2M	Se	1	Sg		N	1530	Y		
Wright Aeronautical Corp.	Hispano Suiza E-4	W	V-90°	8	4	D	190–1800	204–1800	480	2 52	4¾x5½	5 8	125	718		11½		49	.52	025	ohe	S	1	1		2M		1	Sg		N		Y		

*—Engines of foreign manufacture
†—rebuilt
a—applied for
A—Air cooled
Aa—Aluminum alloy
Ae—Aeromarine
Al—Aluminum
AS—Ansani or Scintilla
Au—Automatic
B—Battery ignition
BR—Robert Bosch
Ba—Scintilla booster magneto
C—Cast iron
Ch—Champion
Cylinder Construction
first—head
second—walls or waterjacket
third—sleeve, if any
D—Direct
De—Delco
Dx—Dixie
Ee—Eclipse
E—Epsign
G—Geared
G¹—3:3 epicyclic gear
G²—2:1 reduction gear
G.E.—General Electric
I—Inverted
L—Cylinders in line
Mo—Monel
M—Magneto
Ni—Nickle Iron
N—No
O—Own
ohe—Overhead cam
prr—Push rods and rocker arms
Rad—Radial
Rad S—Staggered Radial
RB—Robert Bosch
Se—Scintilla
Sg—Stromberg
Sg¹—Stromberg NA-U5 duplex
Sg²—Stromberg NAS-3E
Sm—Sum
Sp—Splitdorf
S—Steel
U—U.S.L. Electric
V—Vee
W—Water cooled
Wf—Winfield
X—Extra
Y—Yes
Z—Zenith

THE BUYER'S LOG BOOK

General Electric Welder

WELDING EQUIPMENT naturally being subjected to heavy duty, it is of primary importance that all component parts be of rugged construction. A series of arc welders having this feature is being offered by the General Electric Co., Schenectady, N. Y. Three general models designated WD-200A, WD-300A and WD-400A, and having ratings of 200, 300 and 400 amperes respectively are included in the series. Each type may be furnished for belt, motor or gasoline engine drive and in stationary



View of WD-200A portable type General Electric welder showing rugged construction.

or portable units. These welders are so designed that only one person is required to operate them.

The WD-200A Type includes a ball bearing, self excited, variable voltage generator of the two-pole type. The motor is a G-E standard 10 hp. ball bearing type furnished for any commercial direct or alternating current voltage. The four-bearing motor generator set is connected by a flexible coupling. All wiring is enclosed and a 400-ampere ammeter and 120-volt voltmeter are mounted on the panel. Motor starter and stabilizing reactor are also provided. All units are mounted on a welded structural steel base and are completely assembled and wired at the factory. After inspection and tests it is shipped to the purchaser and is ready for work when received. A running gear can be added when it is desired to make the unit portable.

Among the distinctive features of this welder are the brush shifting handle by which the current can easily be adjusted to any value between 60 and 300 amperes, the self adjusting reactor which automatically steadies the arc under all welding conditions and the excellent commutation at all loads. It is adaptable for use with all commercial sizes of electrodes from 1-16 in. to 1-4 in., also for light carbon welding or cutting. The rugged construction makes it possible to operate the unit for long periods without attention.

The weight of the A-c type is 1575 lb. net and the shipping weight 1750 lb., while the net weight of the D-c type is 1750 lb. and the shipping weight 1900 lb. When running gear is added to make the unit portable the additional weight is 200 lb. in either case.

Massillon Steel Products

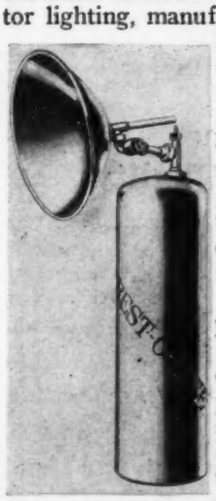
HANGARS OF practically any design or type of construction may be erected by the use of Massillon standardized steel building products, manufactured by the Macomber Steel Co., 10th and Belden Ave., Canton, O. These products include steel roof trusses and columns for all building dimensions and provide decidedly economical construction.

Other Massillon products include fireproof steel purlins, steel lath to carry concrete roof decking, and steel windows and doors. These, with concrete block, tile or masonry wall construction, provide permanent hangars of a highly desirable type. Where wood construction is preferred, decking, siding, sash and doors may be used readily with Massillon columns and trusses. Corrugated iron sheets provide inexpensive siding and are readily adaptable to structures built of Massillon products. Other combinations will suggest themselves readily to those contemplating erection of hangars.

Two models of hangar doors are included in the line of Massillon products. Both are of the sliding type and roll out on steel rails to provide a clear opening at the end of the hangar. Overhead steel guides, running out to a steel column or frame set in concrete, support the doors vertically when they are opened. A reenforced steel frame, mounted on heavy steel wheels, serves for the less expensive type of door. Wood sheathing completes the door and corrugated steel sheets may be added for fire protection. A similar door furnished with annealed steel sheets for fireproof hangars, also can be provided. Both doors are made in standard 10 ft. widths. Double track rails permit the eight sections for an 80 ft. hangar to open with 20 ft. extension to each side of the opening.

Flood Light Attachment

A FLOOD light attachment of new design for use with the small tanks of dissolved acetylene, for truck and tractor lighting, manufactured by the Prest-O-Lite Co., Inc., 30 East 42d St., New York, N. Y., is now being offered by the company. Prest-O-Lite gas tanks are available from service stations throughout the country and by the connection of the new attachment a convenient, portable, powerful flood lighting unit is obtained which can be used for illumination in dark place and for facilitating night work of all kinds.



Light attached to standard tank.

The improved attachment is of simple, rugged and compact construction. Univeral adjustment is obtained with only one swing joint, minimizing the possibility of leakage. Because of its substantial construction and because of its position near the center line of the tank, the attachment itself can be used as a handle in carrying the entire unit.

The reflector, which is 10 in. in diameter can be taken off by removing a single knurled nut. A new type of burner is used which will not "carbon up." This burner is placed at a fixed focal point and requires no adjustment.

$10

The New Johnston

AIR SPEED INDICATOR

Our
PIONEER LINE

and
INSTRUMENT SERVICE

We are headquarters for leading avigation instruments, the famous Pioneer line.

Tachometers
Compasses
Altimeters
Air Speed Meters
Turn and Bank
Earth Inductor
Fuel and Oil Gauges
Etc., etc.

The New Avigo Compass — tested and proved after long, critical experience.

For quick action use our expert instrument calibration, inspection and repair service.

Give your passengers an added thrill at little cost. Let students observe landing speed.

The New Johnson Air Speed Indicator attached to the outer strut does the trick without pitot tubes or connections of any kind.

Each indicator is carefully calibrated and tested to remarkable accuracy, is beautifully baked enamel finished, adds to the appearance of any airplane and offers negligible parasite resistance or drag.

Service Quality

When quality supplies are wanted quickly at the right price, try us. We have long been pioneers of service in a pioneer industry.

Send for this Catalog
It contains a big line of supplies needed by manufacturer, operator and pilot.

Johnson
Airplane & Supply Co.
Dayton, Ohio

Williams-Husky Wrench Set

A NEW Williams-Husky combination wrench set, of great value to aviation mechanics, has been made possible by the recent reciprocal sales arrangement between J. H. Williams & Co., Buffalo, N. Y., and the Husky Wrench Co., Milwaukee, Wis. This arrangement enables each company to merchandise in combination sets the other's quality open-end, or socket wrenches. It is made for sales purposes only and is limited to the items which constitute these sets.

Complete wrench set packed in small sized metal container.

All units are of high quality. Every Williams "Superrench" and "Husky" socket wrench is guaranteed against breakage. The set contains seven Williams' Midget Superrenches of chrome-molybdenum steel, sizes 7-32, 1-4, 5-16, 11-32, 3-8, 7-16 and 1-2 in. Each wrench has two openings of the same size but at different angles (15 and 75 deg.), making it possible to reach places with one opening that would be inaccessible to the other. The wrenches are extremely light and thin with narrow, pointed jaws. They are chrome-plate finished with heads buffed bright.

The Husky wrenches included in the set are eight "Baby" sockets, tapered for work in close quarters, sizes 5-32, 3-16, 1-4, 5-16, 11-32, 3-8, 7-16 and 1-2 in. hex, together with a 5-in. combination tee and a 4 1-2 in. handy grip. The latter can also be used as an extension. They are of full bright nickel finish.

The complete set is packed in a convenient and durable metal box, six 5 1-4 x 2 3-4 x 1 in. The total weight is 1 1-2 lb.

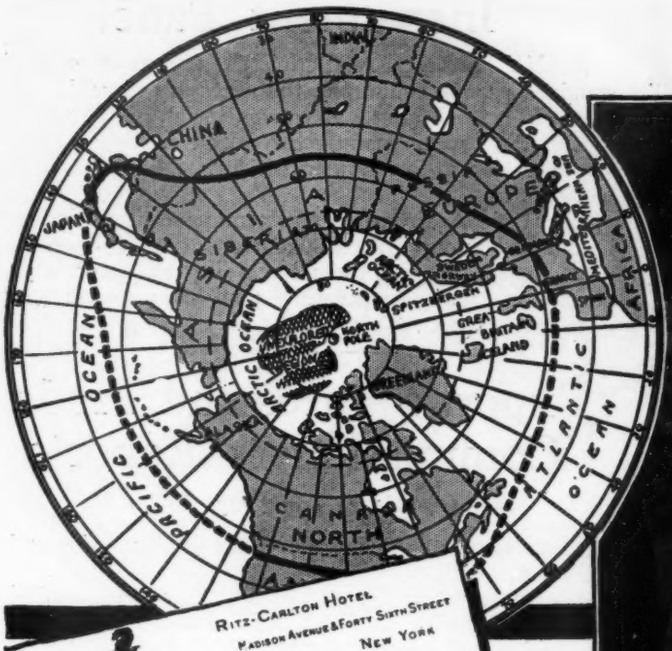
Eveready Flashlights

INCLUDED AMONG the products manufactured by the National Carbon Co., Inc., New York, N. Y., is the No. 2645 five-cell focusing flashlight which is used extensively by aviators and is a valuable addition to the equipment of any airplane. This light throws a powerful beam for a distance of 1,200 ft. or more and has a nickel

No. 2645 five-cell Eveready focusing flashlight which throws 1200 ft. beam.

case equipped with a ring hanger at the case and an attachment for turning on the light permanently. Its load consists of five No. 950 Eveready flashlight unit cells.

Twenty-five flashlights of this type are being used by the Byrd Antarctic Expedition and duplicates of this model have been carried on several famous flights. Another model Eveready flashlight frequently found on airplanes is the No. 2642 three-cell focusing flashlight which throws a beam more than 300 ft.



RITZ-CARLTON HOTEL
MADISON AVENUE & FORTY SIXTH STREET
NEW YORK

TELEGRAPHIC ADDRESS RITZCARLTON
ASSOCIATED WITH THE RITZ CARLTON GROUP OF LONDON

July 24' 28

Dear Mr. Rentschler—

Just a line to let you know how Wasp did a great job for us. In more than eleven thousand miles of continuous flying — no way did it require any adjustment.

The reliability of this motor and my confidence in it greatly helped to hasten the stream of such a strenuous flight. Mr. Mears and I felt that you are to be congratulated

Sincerely yours

Charles P. Collyer

Mr. F. B. Rentschler
Pres. Pratt and Whitney Aire. Co.
Hartford Conn.

Around The World In 23 Days

In their record-breaking trip around the world, John Henry Mears and Captain C. B. D. Collyer flew more than half the total distance travelled. In nine days flying their "Wasp" carried them over 11,000 miles without adjustment.

The fine performance of the motor is attested by Captain Collyer's letter.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD CONNECTICUT

PRATT & WHITNEY, U.S.A.
DEPENDABLE ENGINES

"Lok-Jaw" Pliers

PLIERS WHICH take their name, "LOK-JAW," from the arrangement whereby the jaws may be locked to nuts, bolts and other objects in the manner of a hand vise, have been added to the line of The Lawson Manufacturing Co., 2722 East 53d St., Cleveland, O. The tool is designed with an adjusting screw at the jaws and the compound leverage is said to provide a 1 ton grip at the jaws. The jaws are designed to fit round, square, hexagon or flat objects.

Lawson Pliers

These pliers may be clamped to a nut or bolt-head in an inaccessible place to keep such parts from turning while wrench or screwdriver is applied to the nut or bolt, as the case may be. The knurled head of the adjusting screw is drilled for inserting pin to obtain greater leverage when used as a hand vise. The position of this adjusting screw and the fact that it is heat treated makes it possible to use same as a hammer-head for light tapping.

Springs are provided in the handle and at the jaws, which return the jaws to the maximum adjustment when pressure is released on the handles. The jaws are of steel forgings, hardened and tempered; the handles are of heavy gauge pressed steel and have knurled grips. In the 8 in. size illustrated the maximum jaw opening is 3-4 in.

Lok-Jaw pliers save time in many operations in both hangar and machine shop and a number of aviation mechanics are using them regularly in their work.

Instrument Panel

MANY MANUFACTURERS are now supplying standard panels, containing the necessary aircraft instruments in a single unit. A convenient and highly efficient unit of this type is manufactured by the Consolidated Instrument Company of America, 41 East 42nd Street, New York City.

The Type A aircraft instrument panel is an indirectly illuminated group of consolidated instruments mounted in a single panel and including a Tag altimeter, a Jones tachometer with temperature and oil pressure gauges mounted between.

Export Figures and Trade Commissioners' Reports

(*Continued from page* 1019)

in a standard military plane flown by one of our best known aviators.

The most recent report on aircraft market conditions in South America that has been received was prepared by Assistant Commercial Attache Julian D. Smith at Lima. He made the following observations on aeronautics in Peru which show that United States equipment predominates.

"All Peruvian imports of aircraft and aeronautic products during 1927 were of materials from the United States, 14 planes, six or eight spare engines and a considerable amount of spare parts, such as wings, pontoons, control surfaces, wires. etc.

"The total acquisition, including spare parts, amounted

BROWNBACK
MOTOR LABORATORIES, INC.

More power, with a saving in weight has been, from the start, the chief goal in the design and construction of aircraft engines. With the realization that the radial air-cooled engine fulfills most successfully this important specification, the Brownback Motor Laboratories have concentrated a considerable resource of engineering skill and money for the refinement of engines of this type. They will be pleased to supply you with full information of power units now available and in successful operation in many types of aircraft.

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3 cyl. 35 h.p.
6 cyl. 80 h.p.
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THANK YOU *for mentioning* AVIATION

In the old story, as you will recall, Aladdin had but to rub the magic lamp to summon the wonder-working genie.

AVIATION CALLS ON A MODERN GENIE TO ACHIEVE LIGHTNESS WITH STRENGTH

Twenty-five years ago, on Kill Devil Hill two brothers made the first controlled flight in a powered plane. Yesterday, from a thousand fields ten thousand planes took off.

And since the progress of aviation is walking hand in hand with the reduction of useless weight, who dares put a limit upon tomorrow . . . the future?

Metallurgy, the modern genie, has given the aircraft industry a wonder working resource—Aluminum and its alloys.

In place of heavy cast iron pistons, valve housings, cylinder heads, have come castings of Aluminum alloys, stronger and tougher, weighing only half as much.

This marvelous metal is also playing an important part in the safety side of aviation progress. Bulky, easily shattered wood is being replaced with strong non-warping members of Aluminum. Fragile, combustible veneers have given way to sturdy sheets of Aluminum.

There is hardly a part of a plane to which designers of today cannot apply Aluminum and its alloys with consequent gain in lightness, strength or safety.

In the years of experimentation and tests which preceded the present perfection of Aluminum and Aluminum Strong Alloys for aircraft use, Aluminum Company of America has, naturally, taken a leading part.

Whether it is Aluminum you want, pure or alloyed, fabricated into parts or ready for your own manufacture, or whether your present need is for technical information, here is the sure source to which to turn.

ALUMINUM COMPANY OF AMERICA
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ALUMINUM AND ITS ALLOYS *for Aircraft*

These aircraft parts and many others employ Aluminum or its alloys in the form of sheet, tubing, rod, forgings, castings, et cetera, manufactured by Aluminum Company of America.

Fuselage
- Laminated Fire wall between motor and pilot seats
- Cabin
- Lining for bottom
- Cowling
- Hull Frame
- Hull Sheeting
- Fuselage Frame
- Fuselage Covering
- Decking
- Walk Ways
- Channels
- Fabricated Structural Shapes
- Angles
- Gusset Plates

Wings
- Ribs
- Beams
- Leaving and Trailing Edges
- Longerons and Struts
- Wing Streamlining
- Bronze Powder with clear nitrate dope for treating fabric
- Spars
- Internal Wing Section

Landing Gear
- Pontoons
- Disc Wheels
- Brake Shoes

Control Apparatus
- Control Fittings and Strut Terminals
- Conduit for Control Wires
- Pulleys
- Throttle Handle Controls

Motor
- Crank Cases
- Cylinder Heads
- Blower Section
- Pistons
- Connecting Rods
- Valve Housings
- Manifold Intake
- Rocker Support Intake and Exhaust
- Ignition Wire Tube
- Propellers
- Super Charger Impellers
- Battery Boxes

Fuel & Oil Supply
- Gas and Oil Tanks
- Standpipes in Gas Tanks
- Oil Lines
- Gasoline Lines
- Oil Pans
- Oil Cooling Parts
- Oil Pump End Plate
- Oil Suction Pump, inner and outer body
- Oil Pressure Tube

Furnishings
- Seats and Chairs

Instruments, etc.
- Fittings, etc.
- Instrument Board
- Rivets
- Screw Machine Parts

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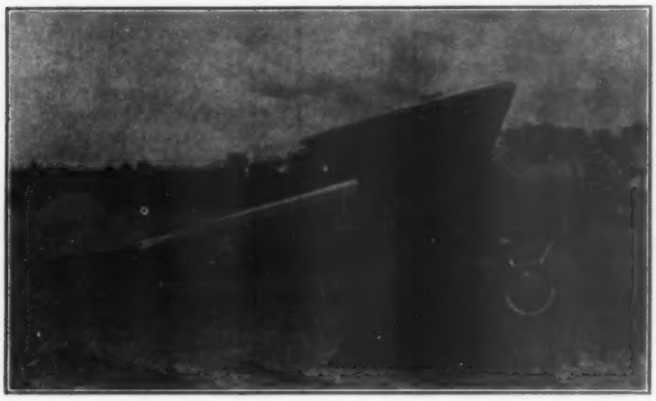

139 m. p. h.

By official test, the fastest ship in the Reliability Tour

Specifications

Weight Empty	1,800 lbs.
Wing Span	36 ft.
Wing Area	240 sq. ft.
Length	25 ft.
Useful Load	1,400 lbs.
Seating Capacity	Pilot and 2 Passengers

Performance

High Speed (Sea Level)	139.1 M.P.H.
Landing Speed	45 M.P.H.
Cruising Speed	115 M.P.H.

Power Plant

Engine	Whirlwind
Horsepower	200 at 1,800 R.P.M.
Fuel Capacity	90 gals.
Oil Capacity	5 gals.

Equipment

Starter, Brakes, Metal Propeller, Compass, Air Speed Indicator, Navigation Lights, Tachometer, Altimeter, Clock, Fire Extinguisher, Fuel, Oil Pressure, and Oil Temperature Gauges, Air Corps Throttles, Strainer and Fuel Valve, Exhaust Manifold, Cabin Heaters.

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MARYSVILLE, MICHIGAN

to about $300,000. These purchases were made by the Peruvian Navy. Six planes were for the commercial route San Ramon-Iquitos, operated since January 1, 1928, by the Peruvian Navy.

"The Army purchased no new equipment during 1927 nor were there any other importations. The United States Domestic Export figures for aircraft and parts during 1927 show eight planes valued at $190,111, three engines valued at $3,718 and parts valued at $149,388. According to our understanding, all 14 planes mentioned above, arrived in Peru during 1927.

"For the past five years one American pilot operating an air taxi service has averaged 35,000 mi. per year and has carried 300 passengers annually without fatalities. The Naval Commercial Air Service between San Ramon and Iquitos has averaged one and one-half trips per week during the first six months of operation without fatalities."

Mr. Smith mentioned also in his report the activities of an American company that has carried on dusting operations in the Canete Valley and has a concession to establish air mail freight and passenger services to be inaugurated in 1928.

It is noted that there were no appreciable shipments of aircraft to Europe, but that engines and parts have been exported to European countries in increasing numbers.

A report from Switzerland submitted by O. B. Moussman in the office of the American Commercial Attache at Berne, sounds the keynote of the situation insofar as the entry of our aeronautic products in Europe is concerned. It is well known that in Europe the air lines are subsidized as are the manufacturers and that we cannot hope to accomplish much in the way of sales except possibly in future years to the private owner.

UNITED STATES EXPORTS OF AIRCRAFT PARTS AND ACCESSORIES, EXCEPT TIRES

Countries of Destination	*Calendar Years* 1926 *Value*	1927 *Value*	*First 6 Months* 1928 *Value*
Canada	21,211	142,249	277,910
Brazil	6,494	1,660	40,358
United Kingdom	16,322	42,717	31,381
Russia in Europe	47,671	117,139	27,581
Japan	75	514	24,354
Germany	1,377	3,861	21,486
Cuba	3,392	11,014	15,520
Chile	11,030	34,948	15,375
China	.....	18,664	14,628
Peru	13,014	149,388	10,222
Netherlands	25	402	9,333
Argentina	3,496	5,508	6,919
Mexico	4,822	3,369	4,948
Colombia	6,834	4,014	4,754
Poland & Danzig	.....	.....	3,925
Czechoslovakia	.....	70	3,680
Italy	3,020	3,498	3,364
Norway	250	2,080	1,925
Other countries	11,296	29,016	9,432
Total	150,329	570,111	527,095

The report from Switzerland shows how that country is importing aircraft, and the countries of origin. It also shows that there were a few exports. The report follows:

"During the first six months of 1928, six airplanes were imported, valued at $54,000, of which two were from Germany, two from Holland, one from Great Britain, and one from China. Aircraft parts and accessories imported during the same period totaled seven metric tons valued at $56,570.

(*Continued on page* 1042)

Approved for use in cam engines

FAIRCHILD CAMINEZ ENGINE CORPORATION
FARMINGDALE, NEW YORK

August 22, 1928

Kendall Refining Co.
Bradford, Pa.

Gentlemen -

Now that the National Air Tour is over and we have finished the inspection of the Caminez Engine I flew through the tour I wish to thank you for your courtesy and hearty cooperation in supplying me your Kendall J Aero Oil.

The engine ran perfectly with Kendall J Oil through the hot country and the cooler temperatures of high altitudes and the oil stood up very well under all conditions we met. On tearing down the engine we found the parts in excellent condition with no wear to the cam and rollers which parts receive the most severe punishment. All parts were free from carbon deposits showing that the oil had not broken down from heat.

I will certainly recommend Kendall J to all users of Cam engines as an excellent oil for their use.

Thanking you again for your hearty cooperation,

Very truly yours,

FAIRCHILD CAMINEZ ENGINE CORPORATION

M. Gould Beard

M. Gould Beard
Installation Engineer

MGB/SK

The Fairchild Caminez Engine Corporation endorses Kendall Penzbest Oil

THE use of Kendall Penzbest Oil in the Fairchild Caminez Engine throughout the National Air Tour was characterized by the splendid performance of the Engine and by the excellent condition of the parts at the end of the gruelling test. The letter from the Fairchild Caminez Engine Corporation reproduced here will be of interest to all users of airplane engines.

A lubricating oil can be no purer or finer than its source permits. Pilots and operators know of the superiority of Pennsylvania oil but many do not know that the grade derived from the small Bradford district in the Pennsylvania oil field, is the purest of all Pennsylvania oils.

It is because Kendall Penzbest is refined *exclusively* from Bradford grade of Pennsylvania crude that it can be purified by simple mechanical methods and without resort to chemicals. It reaches your motor free from acids and other impurities, safer, easier flowing, better able to resist heat, less affected by severe cold.

Whatever type your engine may be, Kendall Penzbest will enable it to run sweeter, develop greater power. Dilution, sludge and carbon troubles will no longer be a problem. And after 30 hours of flying Kendall Penzbest is still a better lubricating oil than most other oils after 10 to 15 hours.

May we send you a copy of "Ground Flying on the Subject of Lubrication"? Address, Aviation Division, Kendall Refining Company, Bradford, Pa.

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"During the six months January-July, 1928, one airplane was exported to Austria and two to Colombia, at an average price of $6,000 each; besides, 1731 lb. of various parts and accessories worth $6,000 were also exported. The above figures do not include exports of the famous Swiss magnetos and other electric devices, airplane engines and engine parts, as these products are not listed separately in the Swiss Custom Tariff but are included under various machinery classifications.

"Swiss civil aviation and air mail service, although partially subsidized by the Government, is in the hands of two private Swiss companies, besides several foreign companies which maintain regular itineraries in this country. The Government maintains workshops for the construction of military planes. In the past, nearly all military planes were purchased abroad, but at present a Swiss inventor is working on a model of a new type of pursuit plane which may become a standardized model. Apart from that, the French Dornier works and the German Mercedes-Benz company maintain branch factories and assembly plants in Switzerland. It is thought, therefore, that for the next few years no contracts of any importance will be let to any foreign firm outside the ones mentioned above. A Swiss consortium has recently secured the exclusive right of manufacture and sale in Switzerland of the Czechslovak light of 60 hp. "Avia" B. H. 77 airplane, produced by the Skoda Company of Prague.

The tables accompanying this article show the trend in aeronautic product exports during 1926, 1927 and the first six months of 1928. AVIATION will publish further market reports from time to time which will give details such as those above which represent a cross-section of conditions existing throughout the world, militating either against, or favorable to, the exportation of American aircraft.

Airlines Outside of the United States

(*Continued from page* 1015)

man and Netherland companies, but the two Swiss companies of Basel and Zurich cooperate with the German company Luft Hansa in services between Madrid, Barcelona, Marseilles, Swiss cities and Berlin, and between Swiss cities and Vienna via German cities. They plan to built up these and other international services over Switzerland and are making great progress.

France has maintained regular air services since 1919, when her first was started between Paris and London. The planes of six French companies fly on routes extending over 12,000 miles and serve 22 countries on three continents. In 1927 they flew over four million miles and carried 21,000 passengers. The total number of ton-kilometers reported was 1,388,173 of which there were 771,700 of passengers, (100 kilograms is counted for each passenger) 445,591 of goods and baggage and 171,-282 ton-km. of mail.

The French subsidy to air transportation companies was increased from 79,000,000 francs in 1927 to 115,000,-000 francs for 1928 and a larger sum is proposed for next year. The purpose has been to provide rapid air mail and passenger services between Paris and the colonies and the capitals of friendly countries, and recently an air mail service to South America. The French traffic is lighter than that over the shorter Netherland lines, but it is growing. Extensions of the French system into the near East and into Africa are planned. The 3,500 mi. section in Brazil, Uruguay and Argentina may if plans are

Of course—

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Winner of the National Air Tour

Was Equipped with HASKELITE

THE builders, the Advance Aircraft Company, write, "It may interest you to know that HASKELITE plywood formed a very important part in the construction of the Waco Ten which won the National Air Tour by a margin of nearly 3000 pounds over the nearest competitor.

"This contest involved 6500 miles of flying over some of the most difficult sections of the country."

Since 1919 the Advance Aircraft Company has used HASKELITE and officials of the company have written, "Up to date we have not found a plywood that meets our requirements as well as HASKELITE."

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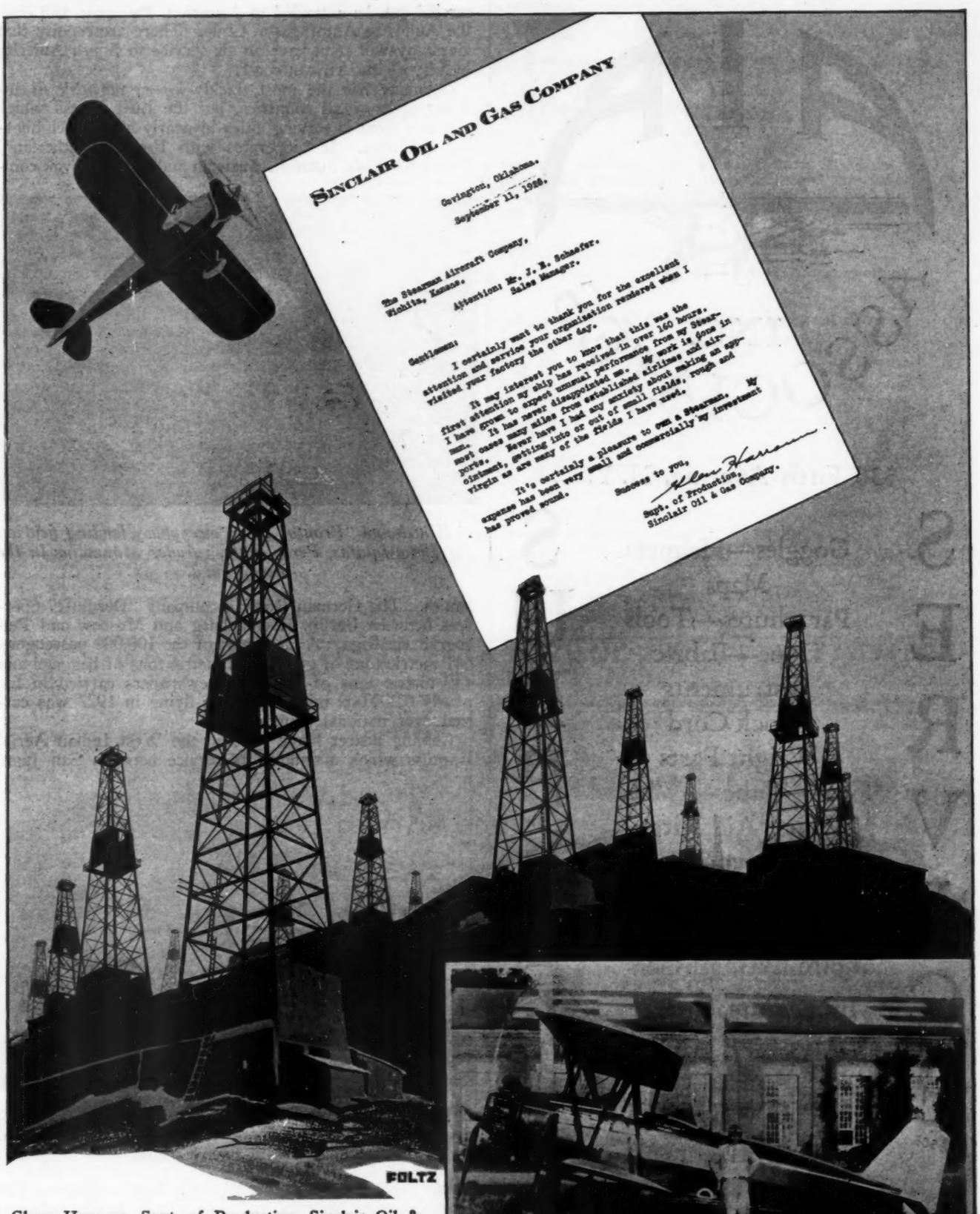
SINCLAIR OIL AND GAS COMPANY
Covington, Oklahoma,
September 11, 1928.
The Stearman Aircraft Company,
Wichita, Kansas.
Attention: Mr. J. E. Schaefer.
Sales Manager.
Gentlemen:
I certainly want to thank you for the excellent attention and service your organization rendered when I visited your factory the other day.
It may interest you to know that this was the first attention my ship has received in over 160 hours. I have grown to expect unusual performance from my Stearman. It has never disappointed me. My work is done in many cases many miles from established airlines and airports. Never have I had any anxiety about making an ointment, getting into or out of small fields, rough and virgin as are many of the fields I have used. My expense has been very small and commercially my investment has proved sound.
It's certainly a pleasure to own a Stearman.
Success to you,
Glenn Harroun
Supt. of Production,
Sinclair Oil & Gas Company.
FOLTZ

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carried out, be extended to Asuncion, Paraguay and over the Andes to Antofagasta, Chile. There are reports that Germany will soon have an air service to South America by way of the African coast.

Germany has the most thickly-woven network of interior lines of all countries, but the Luft Hansa which operates them is serving cities in nearly all the neighboring countries. It cooperates with French, Netherland, Swiss, Swedish, Spanish, Austrian and Czechoslovak com-

A Whirlwind "Pronto" in an emergency landing field on the Lima-Iquitos, Peru, route. Andes Mountains in the background.

panies. The German Russian company "Deruluft" operates between Berlin, Koenigsburg and Moscow and Petrograd via Riga. A large part of the 100,000 passengers, 641 metric tons of goods, 822 metric tons of baggage and 449 metric tons of mail and newspapers carried in the nearly 6,000,000 mi. of German flying in 1927 was carried over national boundries.

Coming nearer home we find the West Indian Aerial Express which maintains its service between San Juan,

A Whirlwind powered Keystone "Pathfinder" of W.I.A.E. used on the San Juan, Porto Rico, and Santigao, Cuba, via Port-au-Prince airline.

Porto Rico, and Santiago, Cuba, via Port-au-Prince. The Pan American Airways, Inc., has a daily service between Key West and Havana and a three times a week service between Havana and Santiago via Santa Clara and Camaguey. They will soon start a service between Key West and Panama via Havana, Merida, Mexico, Belize, British Honduras, Teguciagalpa, Honduras, Managua, Nicaragua, and San Jose, Costa Rica. A Mexican line will connect at Merida and extend to Vera Cruz.

Two American companies have contracted for air ser-

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Outstanding 1928 Achievements
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National Air Tour, David Levy, only perfect score.

Mears-Collyer, Round-the-World flight.

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PN-12 Navy plane endurance and altitude records.

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Perfect performance—complete control—the ship of ships for flying safety into and out of small fields—for flights long or short!

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Packard Lac-kard (Corona-Proof) cable has been developed to meet the requirements of modern engine design —high speed, high compression, continuous service. It is the last word in high tension ignition cable. The insulation specially compounded is thoroughly protected by a braid and multiple coats of an exclusive pyroxylin lacquer which hermetically seals the insulation from the attacks of corona as well as oil, grease, and moisture.

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vices in Peru and one of these will soon operate between there and Panama. The "Scadta" company in Colombia has extended its line from Buenaventura to Quito, Ecuador. A line between Seattle and Vancouver was started in July, and one between New York, Albany, and Montreal will be inaugurated in October. The Post Office Departments in the United States and Mexico have arranged with each other and private operators for a connecting service between the existing American net of air lines and Mexico City.

These are forerunners of a vast system of air services between American countries.

Most European companies belong to the International Air Traffic Association which is working for uniformity and cooperation among the operators. Similar conditions are offered the traveling and shipping public by the companies and they are exchanging traffic and helping each other to build it up. There are other organizations engaged in boosting international air traffic and they are making steady progress.

International air transportation is well established. It is making rapid progress and will reach enormous proportions. Aircraft with greater efficiency and capacity, the advertising of services and soliciting of traffic and efficient management of air transport services will be important factors in this growth. The last mentioned is not least because it is placed at the end.

Proper Packing Methods for Export

(*Continued from page* 1013)

pieces of same material; the 2 x 4 in. supports run the entire width of the case, but are not attached to the side walls. A piece of wood with angle iron fittings is carried up both sides of the case and fastened to a cut-out pine fitting having aluminum sides which is placed over the center bulk-head of the pontoon. This permits the case to be placed in any position without damaging pontoons or handling truck on which the pontoon rests. The wing floats, one at each end, are packed in the same case. Two 2 x 4's running crosswise and four uprights, forming a cradle which is lined with burlapped felt and bolted together, hold the wing floats securely in position. This case also contains small repair parts and wire struts which are securely tied to the flooring.

Another System Employed

Another well known exporter of airplanes employs methods of container construction and bracing for his heavy planes which are slightly different from the system which has already been described. This manufacturer states that since the illustrations were taken further developments have been made in connection with the method of mounting the fuselage in the box. The latest method consists of mounting the fuselage on a separate skid similar to the one shown in the accompanying photographs, except that the skid is provided with a rocking beam cross member which engages the fuselage immediately aft of the engine. This rocker beam has two points of attachment to the fuselage and a single point of attachment to the fuselage skid. This point of attachment is in the center of the skid and consists of a bolt with its axis longitudinal to the fuselage. Only two additional fixed points of attachment are provided to the skid—one on each side of the fuselage—about five feet aft of the rocker. This, therefore, gives a three-point suspension which permits a reasonable amount of longitudinal twist-

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Practical Science of Aviation in ten lessons. This course is free if followed by flying course in either of our schools.

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Szekely motor	*Le Blond motor*
$1950	**$2350**

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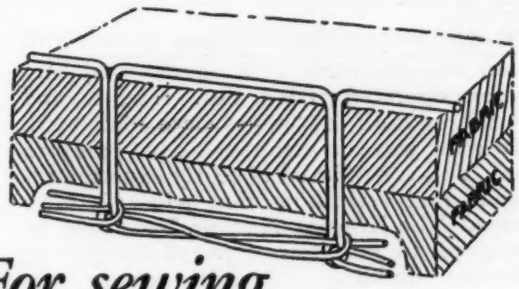

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It has taken many years of studious effort and costly experimenting to bring aircraft to its present position in the public eye. The planes had to be developed to a point where enough safety was approximated to induce the public to become sufficiently interested to make use of them. Now they are rated as "Common carriers."

We have been carrying on experiments in large doors for hangars and aviation buildings. Airport owners and operators, whether they be corporate, municipal, or private, have all been through costly experiments with various kinds of large doors. Surely, it is a costly experiment to put on an unsatisfactory door that does not operate quickly, easily, and economically. Hangar doors in particular must operate expeditiously when called upon, else valuable time is lost.

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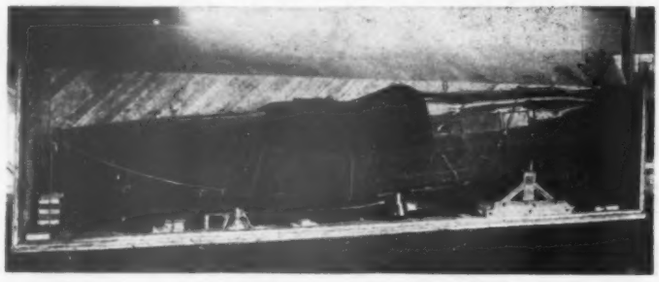
ROLLING · DOORS

ing without stressing the fuselage structure. In addition, a flexible ash member is provided at the end of the skid, directly beneath the engine crank shaft instead of the rigid member. This flexible ash member permits a limited amount of bending without throwing undue stress on the engine crank shaft and it still performs its main function, which is to act as a support for the overhang weight of the engine and to take up vibration.

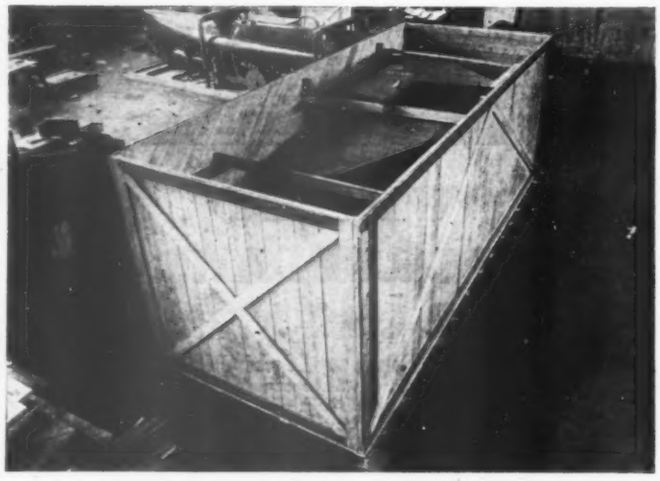
The tail end of the fuselage is supported by a box frame which completely surrounds the fuselage, bedded



Showing how wheels, propeller and hub cap are fastened to flooring. Case dimensions are: 25′ x 4′ x 6′4″. Gross weight, 4,400 lb. Net, 2,196 lb. (Curtiss photo.)

at the corners with hair felt about one inch thick. This frame is sufficiently flexible so that it will weave with the twisting of the fuselage box and yet is sufficiently rigid to offer ample support for the overhang weight of the fuselage tail, and also to absorb vibration.

The cases for fuselage, wings and tail surfaces are constructed on a skid of 4 x 4 in. lumber on which is built a flooring of 1 x 6 in. sheathing. The frame of the case is constructed of 2 x 6 in. material; 1 x 6 in. sheathing is used throughout for sides, tops and ends. All sheathing is placed on the inner side of the crate framework. The crates are braced with four uprights, six diagonals and two horizontal braces. One-quarter inch gusset plates



One type of panel box used when panels can be dismantled into smaller units. Case dimensions are: 6′10″ x 3′10″ x 3′10″. Gross weight, 3,200 lb. Net, 817 lb. (Curtiss photo.)

are placed over joints and lagged into place with three inch lag screws. Tarred roofing paper is used throughout the case and an additional covering of tarred roofing paper is placed on the outside of the top.

Generally, the landing gear and propeller are fastened securely to the floor of the box containing fuselage. Floats are, as a rule, packed separately in cases of similar construction to the ones described for fuselage, wings, etc. It will be noted from the illustration that ventilation

Miller Airplane Products Again Lead

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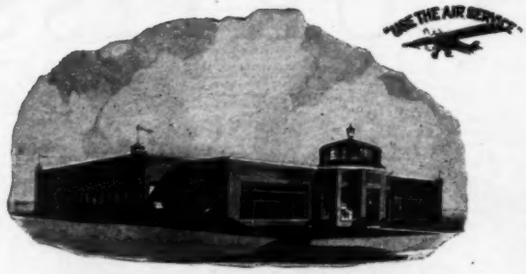

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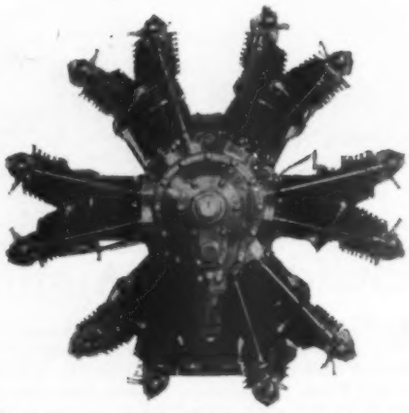

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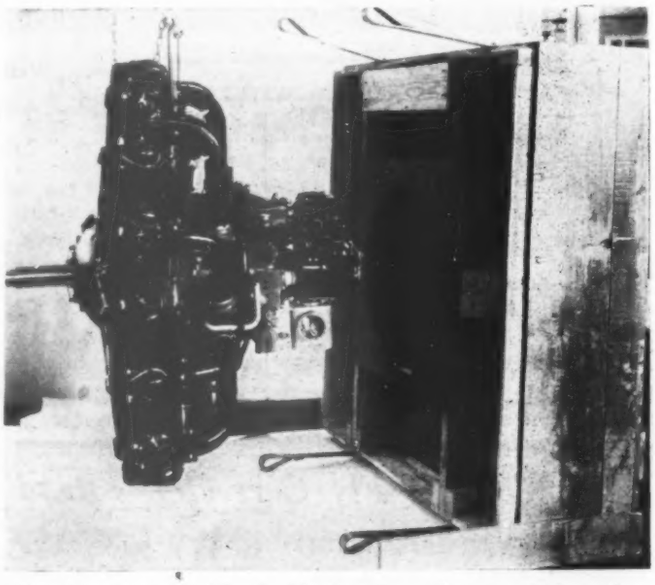
CHALLENGER

Curtiss

holes have been provided near the top of each end of case and that wire mesh has been placed over these openings to prevent rodents from entering.

A manufacturer of airplane engines has furnished the following specifications for their export case for 600 and 800 hp. "V" type engines:

The engine is first cradled in a frame-work, the two lower members of 2½ x 6½ in. lumber, beveled at ends and forming skids. The upper members of this frame, which fits snugly around the engine casing, are of similar material. This framework is held together by four uprights of 2 in. x 2 in., machined to 1⅝ in. on all sides and the skid members are tied together by four 2 x 6's placed in front of each upright and bolted securely to the engine skid. Three diagonals of 1⅝ in. lumber give additional rigidity to the engine skid frame. Two eye bolts of one inch stock and of one and one half inch diameter are placed at each end of the upper frame to handle engine when removing from outside container. The outside



Showing lower half of shipping box for a radial engine. Note steel plate to support engine. (Pratt & Whitney photo.)

case is mounted on a skid of 3 x 6 in. lumber, beveled at the ends, and is of three quarter inch tongued and grooved lumber, constructed throughout of doubled thickness, each lap of material running at right angles to the other. For additional support 1¾ x 4 in. stringers are placed on the inside, running the entire length of the sides and ends of the case. The top of the case is similarly reinforced by two 1¾ x 3⅝'s on the inside and one 2 x 4 nailed to the cover on the outside. Four oval pin anchor shackles running the entire height of the case near each corner and bolted securely to the sides and bottom present ample facilities for handling the case. The engine is first sprayed with rust-preventing oil and is completely covered with waterproof paper.

The following are the net and gross weights of 600 and 800 hp. engines when packed for export:

	Net Weight	*Gross Weight*
600 hp.	795 lb.	1,225 lb.
800 hp.	1,215 lb.	2,140 lb.

The following is typical for the packing of radial engines of 700 and 800 lb. net weight. Both engines are packed in boxes of similar design and construction, differing only in size. The boxes are made in two sections, upper and lower. The lower section is a heavily framed, bolted section to which the engine is mounted, crankshaft

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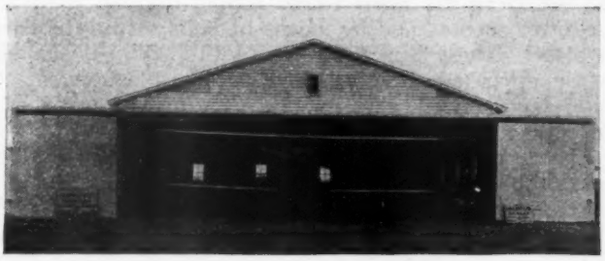

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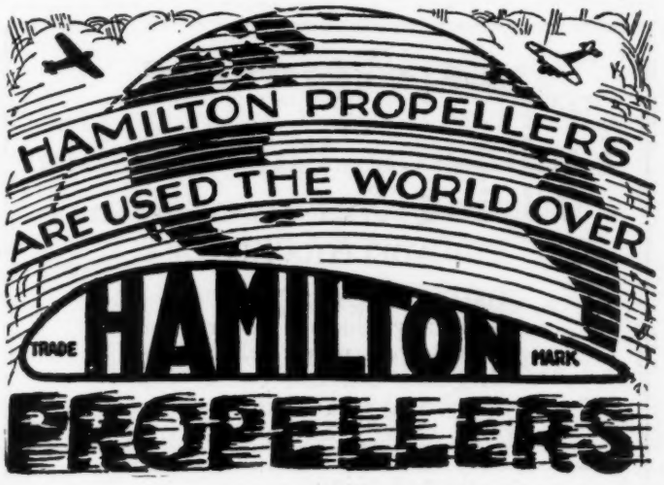

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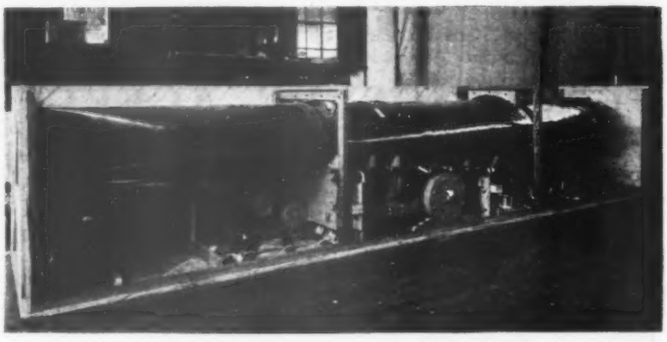
up, by means of a ¼ in. iron mounting plate. The upper section, or cover, telescopes outside of guides on the lower section so that the outer surface of the box is flush.

Four strap iron lifts, ¼ x 1½ in., are provided, and are bolted to the main frame supporting the engine in the lower section, and by means of bolts secure the cover in place. These lifts have eyes with 1¼ in. hook holes in the upper end and a seal is provided on one of the cover bolts. The cover is plainly marked on top; "This side up—Handle with care."

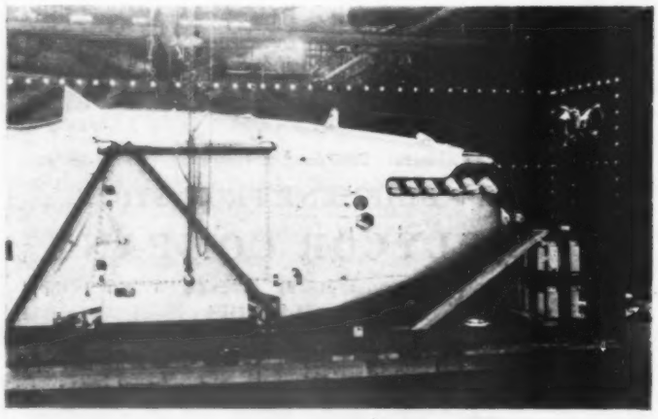
Three skids, 2 x 6 in., laid flat and spoked to the bottom, support the weight of box and engine on the floor.

Yellow pine and spruce wood is used entirely for the box, the sheathing being tongued and grooved and laid



Showing a pontoon and handling truck mounted in a shipping box. Note weight distribution. Case dimensions are: 24'10" x 5'2" x 5'4". Gross weight, 3,692 lb. Net, 953.

double at right angles or diagonally, with tarred paper between layers. The engine support framework and braces are 2 x 6 in.; the corner pieces of both upper and lower sections are 2 x 4 in. and cover braces and reinforcements are ⅞ x 4 in. These dimensions are nominal and specifications call for the material to be thoroughly



Showing the method of supporting a fuselage of a heavy plane in a shipping crate. (Glenn L. Martin photo.)

seasoned and kiln dried. All nails are cement coated and commercial three-eighths inch bolts with washers and square nuts are used throughout.

Four chest handles are provided for lifting and lowering the cover section. Accessories are packed in small boxes built into the lower section and provided with screwed on lids. All unpainted parts of the engine, except the propeller shaft are cadmium plated. The shaft is coated with a rust-preventing grease and wrapped with heavy paper, as are the oil inlet and outlet nozzles.

(*Continued on page* 1054)

A WALL SECTION OF
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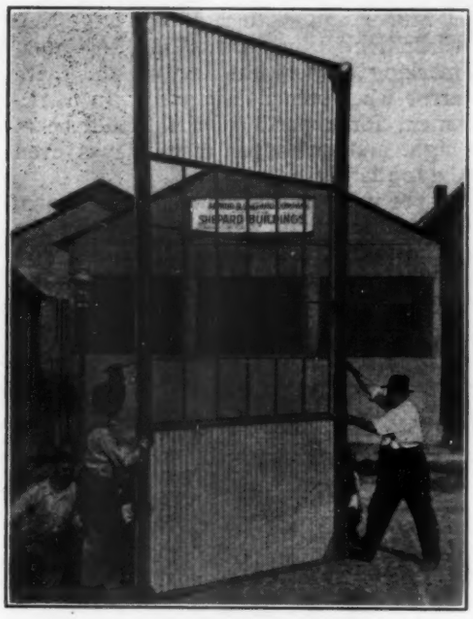

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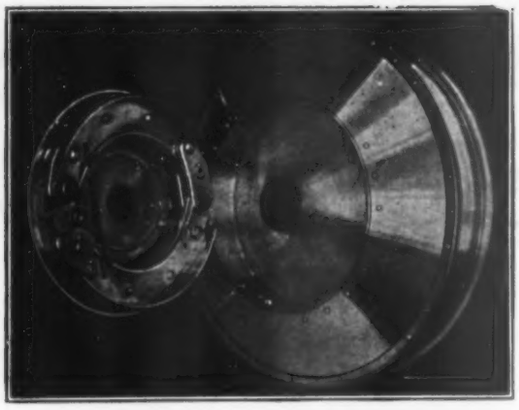

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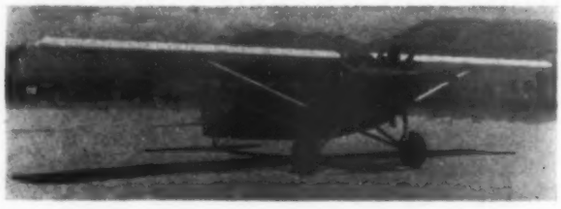

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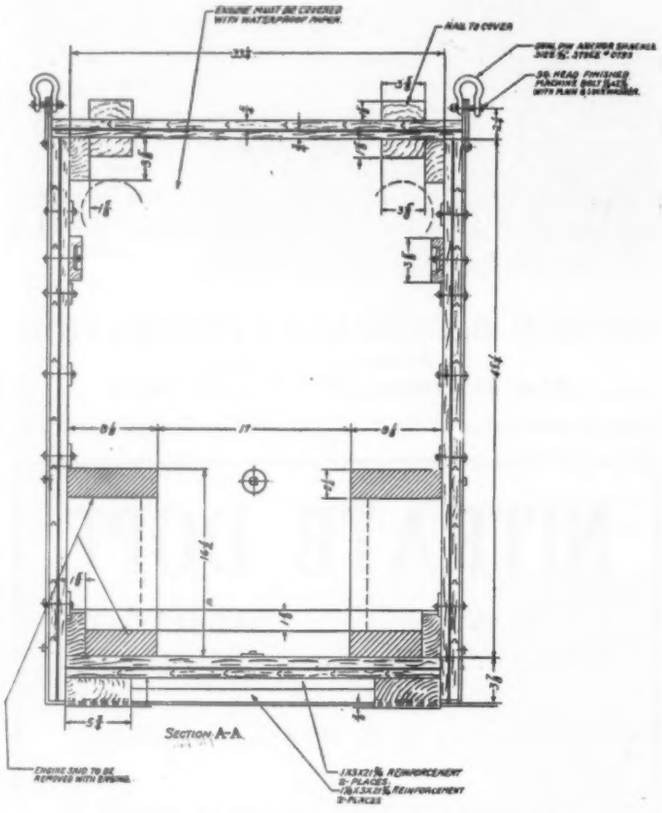
To insure the safe arrival of export shipments at their foreign destination proper and distinct marking is absolutely essential. Clear, legible brush marking is permissible, but stencil marking is more satisfactory and there is less chance of error when stencils are used. In marking airplane equipment for export, stencils should be at least five inches high, and on larger cases marks even higher would not be too large.

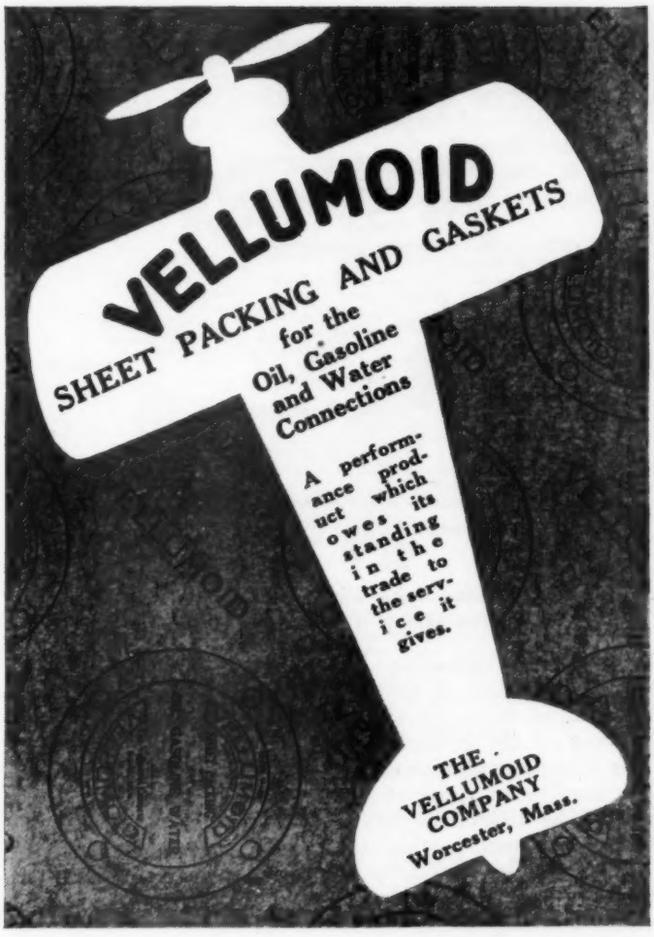
Markings must agree in every detail with those shown on invoices and bills of lading in order to simplify the work of checkers, customs authorities and others who handle the goods. All the marking should be together and

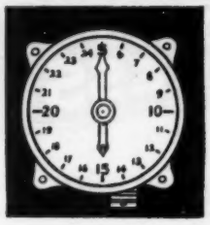


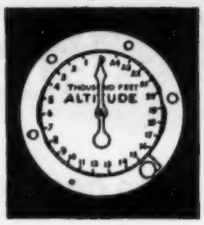
CROSS SECTION OF CASE CONTAINING AIRPLANE ENGINE

not scattered over the face of the case. A prominent place should be given the consignee's name, the destination and routing. These must be in large letters and, if possible, in the center of the face of the package. The weights (gross, tare, net or legal), cubic measurement, and serial numbers are generally placed in the corners.

The size and legibility of stenciling should be given particular attention. That a good quality of black waterproof stencil ink or paint be used is of primary importance. In case the articles to be stenciled are of a dark color, white ink or paint should be substituted for black. There are many excellent waterproof marking inks available to exporters. Fountain brushes are commonly used because they assure a clear, legible marking. Many exporters cover all marks with a coating of shellac, which costs but little yet makes the marking absolutely impervious to dampness and water and prevents rubbing off. The composition of the United States Army standard black stencil paint is as follows: Pigment 50 per cent.,







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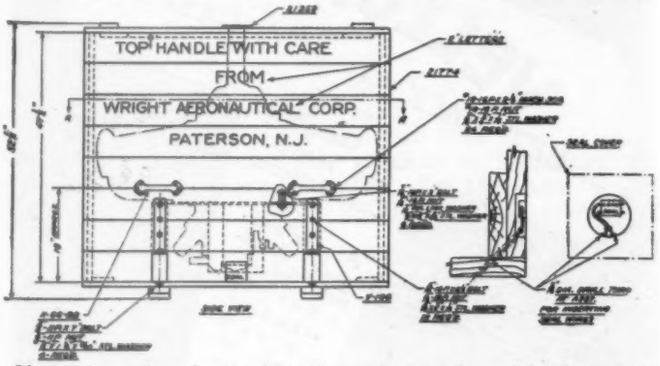
There should be inclosed with each case a packing list showing the contents of the case as an aid in tracing any



Side view drawing with dimensions of a shipping case containing a Wright engine.

losses. Each case should also carry a duplicate set of markings so that if any or all of the exterior markings are defaced there will still be ample information to insure delivery of the goods to their proper destination.

It is obvious that caution marks not in the language of the country of destination are of little value, for they will not be understood by those who handle the shipments. Many exporters, particularly German, instead of marking a case "fragile," call attention to the character of the contents by symbols on conspicuous parts of the case. An arrow pointing to the top of the case indicates "This side up" in any language.

Government Assistance for Aeronautic Exporters

(*Continued from page* 1011)

the firms have been in business and their general business reputation.

Foreign representatives of aircraft and equipment manufacturers are welcome to come to Washington before sailing and obtain what information they need on the countries to be visited. Before the three demonstrating missions left, which have recently returned from South America, they called at the Department of Commerce headquarters, where information was given to them on the South American market prospects, and arrangements were effected for their reception there. Similar service is available to all bonafide American firms.

A broader aspect of the work of the Bureau has to do with general trade promotional activities. Negotiations are carried on toward the entry of American aircraft into countries, where such entry is restricted, with the valuable assistance of the Aeronautics Branch. With this practical Governmental service being rendered to the aeronautic industry there is no reason why it should be reluctant to seek foreign markets actively.

Many firms will at this time state that they are so busy with domestic business that they cannot spare attention for export. This is short sighted. Experts believe that the time is not far off when there will be over-production in the aircraft industry. Export business forms an outlet for such conditions and the firm which cultivates it now will have it when it is most needed.

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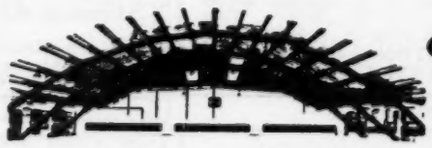

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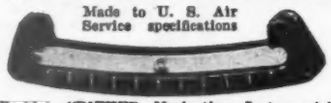
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ONE REBUILT OX-5 motor like new, $450.00. One overhauled OXX-6 motor, $450.00. One Hisso-A, $440.00. Slightly used OX-5 cylinders, $9.00. Valve actions, complete set, $32.00. Upper case, $60.00. Jostes Aircraft Supply Co., 4672 St. Louis Ave., St. Louis, Mo.

FOR SALE: 160 hp., Beardmore completely equipped including propeller and hub. Just overhauled and tested. Good running condition. Glad to demonstrate on test stand. Fine for Standard. Price $350.00. Lyle Hostetter, Frankford, Mo.

FOR SALE: Miller race car. Formerly Tommy Milton's. Holds three world's records. Has $2,500.00 worth of extra parts. Price $2,750.00. Will consider a good ship in trade. H. Kohlert, St. Charles, Ill.

MAKE US an offer: Brand new A7-A Hall-Scott 100 hp., 4 cylinder engine, complete with two magnetos, one carburetor, propeller hub. Goldberg Bros., 543 Capitol, Indianapolis, Ind.

FOR SALE: Ryan Broughham. Brand new B-1 ship, Wright Whirlwind J-5 motor. Less than 15 hours of flying time. Good reason for selling. Will sell cheap. Location Wisconsin. Best cash price gets ship. Box 1022, AVIATION.

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JN-OX-5, fine shape with oversize valves. Turns 1475. DH wheels, steel landing gear, center section gas tank, double ailerons and recently covered. $700.00 takes it. New Hall-Scotts 120 hp., complete and perfect. $275.00 each. OX-5 excellent condition, just overhauled with hub and extra manifolds, $450.00. Ben Torrey, Corning, Calif.

FOR SALE: Swallow OX, brand new; two weeks old; perfect condition. Flown from factory only. Priced right. Paul Snick, Anderson, Ind.

AT SACRIFICE: Jenny fuselage complete; wood work as good as new; radiator, landing gear, wheels, tires, tail assembly, all newly covered and doped. A wonderful bargain at $125.00. Fuselage nicely farrowed. Good OX toothpick $15.00. Fred Wharton, Jacksonville, Ill.

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FOR SALE: One OX-5 motor in perfect condition; just been overhauled. Also propeller and upright radiator. Box 353, Ft. Worth, Tex.

OXX-6 MOTORS for sale: We have 10 only. Guaranteed brand new OXX-6 motors never unpacked; in the original boxes which we are offering for $1.000.00 each f. o. b., Detroit. Grant Marine Motor Co., 5625 St. Clair Ave., Detroit, Mich.

FOR QUICK sale: Slightly used VX Curtiss 8 cylinder engine, 160 hp., complete with two magnetos and two carburetors. No reasonable offer refused. Goldberg Bros., 543 No. Capital, Indianapolis, Ind.

FOR SALE: OX-5 motor nearly new. Has had but 30 hours. Complete $500.00. Box 1009, AVIATION.

AMERICAN EAGLE OX-5. Bought May, 1928. Not over 50 hours. No crackup Splendid condition. Will take $2,000.00 for quick sale. Smith Auto Co., Conway, Ark.

FOR SALE: One Travel Air biplane, type 4000, license No. C-5433, equipped with dual control, bank and turn indicator, Pioneer compass, oil temperature gauge, oil pressure gauge, air speed indicator, altimeter, clock, Bendix wheels and brakes, extra large tires, air cleaner, Wright Whirlwind motor. Has baggage compartment, engine and cockpit covers, and has been kept in hangar. Ship is in excellent condition and has never been in crack-up. Will deliver any place. Ship lists at $9.100.00, but with additional equipment, cost $9,700.00. Any reasonable offer will be considered. Quincy Aircraft Co., Quincy, Ill.

FOR SALE: Fokker Universal, brakes, J4-B Whirlwind. 70 hours since rebuilding after 500 hours. Ship perfect shape. New International planes on field, OX-5, 150 Hisso. Brockton Airport, Brockton, Mass. New England Distributors International.

FOR SALE: Two new, original crate, OX-5 Hammonsport motors complete (except tools), with Berling magnetos. Also 10 new OX-5 cylinders in perfect condition. Make offer on lot or separately. Write Elmer Metcalf, Danbury, Nebr.

ATTENTION AVIATORS: Graphite valve guides threaded into OX and OXX cylinders. Removable valve seats installed. Graphite piston rings. Prices and descriptive literature upon request. Ill. Flying Co., 507 Locust St., Sterling, Ill.

FOR SALE: Three OX-5 motors very slightly used. Cannot be told from new. $600.00 each. Motors are in original crates with stacks and tools. E. A. Forner, 518 St. Clair Ave., Jackson, Mich.

FOR SALE: Privately owned OX-5, Waco-10. Ship and motor in perfect condition. Always stored in hangar. Priced at $2,200. 00. For quick sale. For particulars write or wire August Esenwein, 167 Oxford Ave., Buffalo, N. Y.

FOR SALE: Waco 10, newly colored; yellow wings; fuselage, orange sides; green nose and top. Miller valve action. Large wheels. Baggage compartment. New rings. Licensed. $2,850. Shattuck Auto Co., Owosso, Michigan.

NEW BURD piston rings for OX-5, 10c each. Brand new Hispano Stromberg carburetors, complete, $55.00. New type extra strength ribbed wrist pins for OX-5, $1.00. OXX-6, $1.00; Hispano, $1.00. New Berling OX-5 magnetos, $60.00. Gasoline level gauges, $2.50, any depth. Dixie converted booster magnetos, $7.50. Air Transport Equipment, Inc., Carle Place, N. Y.

WACO 10, OX-5 motor, dual control, less than 50 hours flying. Large wheels, extra magneto, tire, carburetor, lots of spare motor parts. Ship ready to fly away. Reason for selling, other interests. Best cash offer takes all. H. M. Crader, Towanda, Pa.

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FOR SALE: Combination wing Eaglerock flown 75 hours. Cannot be told from new. Has booster magneto and big wheels. This ship is in excellent condition and must be seen to be appreciated. Price $2,000.00 for quick sale. Will deliver anywhere for expenses. E. A. Forner, 518 St. Clair Ave., Jackson, Mich.

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EXPERT LICENSED airplane and engine mechanic open for employment all types ships and motors. Connected with aviation for six years. Private pilot and best of reference as to mechanical ability. Sober habits. Write or wire. J. F. Byrd, 211 George St., Rocky, Mount, N. C.

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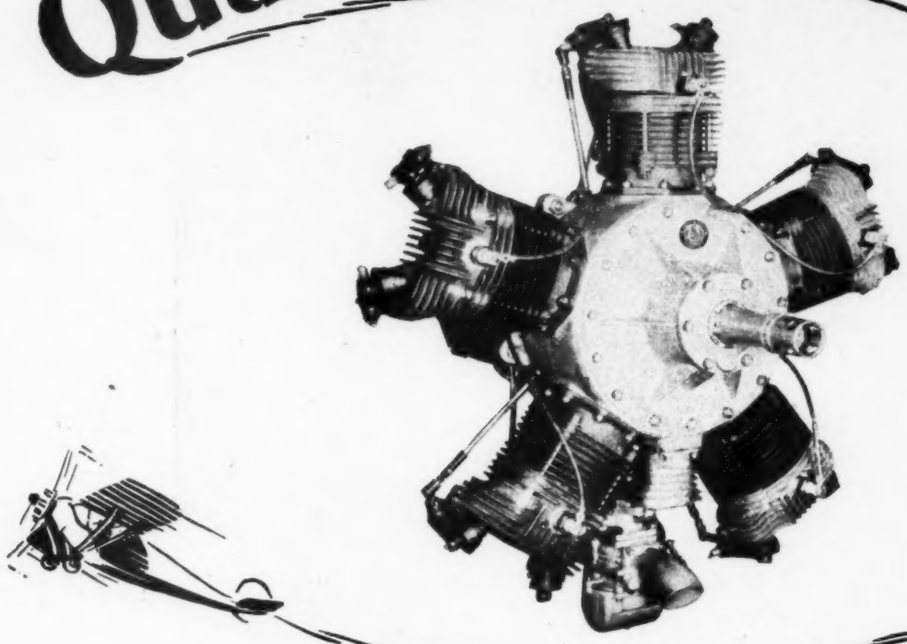

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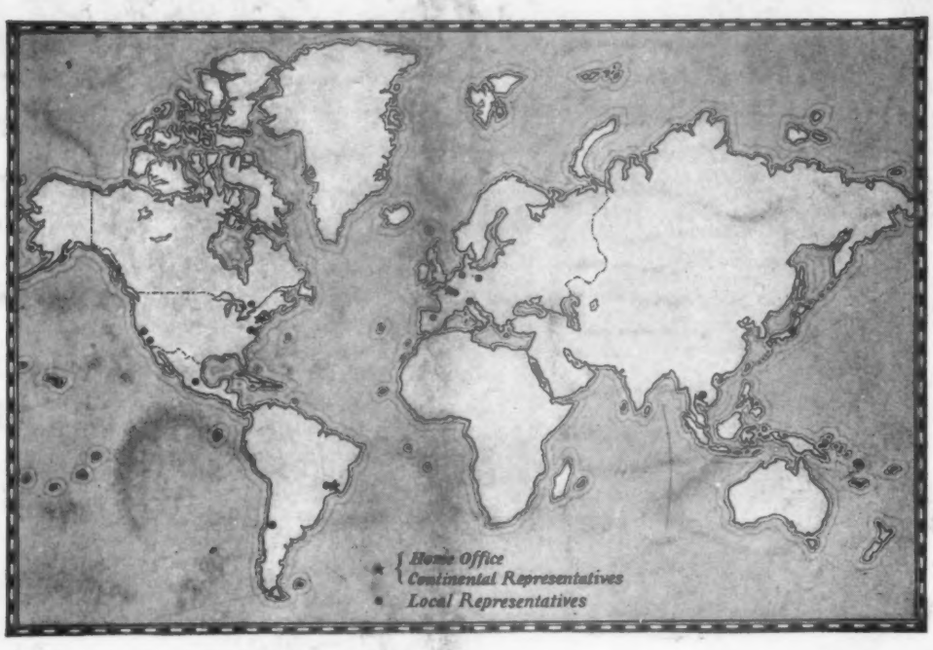

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